SCIENTIFIC RESULTS OF EXPLORATIONS BY THE U. S. FISH COMMISSION STEAMER ALBATROSS.

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No. XXV.—REPORT ON THE MOLLUSK-FAUNA OF THE GALAPAGOS ISLANDS WITH DESCRIPTIONS OF NEW SPECIES.

BY

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(With Plates LI, LII.)

The following list of the land and marine shells of the Galapagos Islands is based principally on the collection made by Prof. Leslie A. Lee and his assistants on the voyage of the U. S. Fish Commission Steamer *Albatross* from Chesapeake Bay by the way of the Straits of Magellan to San Francisco in 1887–'88. Without any attempt to make an exhaustive review of the mollusk-fauna of the group, or even to make a list that would be a complete compilation or catalogue, I have included the principal collections from authentic sources heretofore made known or published, and have added such comments and notes as have occurred to me in the course of my examination of the Galapagos material collected by the *Albatross* and such other examples as are contained in the collection of the U. S. National Museum. It should be borne in mind that this report refers, so far as the marine mollusks are concerned, with a few exceptions, to the littoral and shallow-water species only. The deep-sea material remains to be investigated and reported upon hereafter by Dr. Dall; the few species he has already described are included in the summarized list in the latter part of this report.

GEOGRAPHICAL AND PHYSICAL CHARACTERISTICS.

A brief description of the geographical situation and physical characteristics of the islands of this group may be of some interest in connection with what follows. The Galapagos are a group of islands in the Pacific ocean, about 600 miles to the westward of the coast of Ecuador, to which State they belong. They lie on both sides of the equator, extending from about 2° north to 1° 30″ south latitude, and between 89° 20″ and 92° 10″ west longitude from Greenwich.

There are five principal islands, eleven smaller ones, and a great number of islets and rocks. The larger islands, situated between the

equator and 1 degree south, are Narborough, Albemarle, James, Indefatigable, and Chatham. Of these Albemarle is the chief; it is the only one cut by the equator, is 75 miles long and about 15 in breadth, and its highest summit, according to Humboldt, is 4,636 feet above the level of the sea. Of the smaller islands, three are between the equator and 1 degree south—Jervis, Duncan, and Barrington; three between 1 degree and 2 degrees south—Brattle, Charles, and Hood; and five between the equator and 2 degrees north—Tower, Bindloe, Abingdon, Wenman, and Culpepper; the last only about a mile in length by five-eighths of of a mile in width. As before stated, the highest elevation occurs on the largest island, Albemarle, 4,636 feet; next is Narborough, about 4,100; others vary in altitude from these figures to Tower island, which only reaches an elevation of about 229 feet above the sea level.

VOLCANIC ORIGIN.

The entire group is of volcanic origin, and most of the islands consist of basaltic rocks and masses of scoriæ and lava. "Scarcely anywhere else," says Humboldt in his Cosmos, "on a small space of barely 120 or 140 geographical miles in diameter, has such a countless number of conical mountains and extinct craters (the traces of former communication between the interior of the earth and the atmosphere) remained visible." Darwin, who visited the Galapagos in the expedition of the *Beagle*, calculated the number of the craters at nearly two thousand, and two of the craters were simultaneously in a state of eruption. He wrote, "On all the islands streams of a very fluid lava may be seen, which have forked off into different channels and have often run into the sea." On Albemarle, "the cone mountains are ranged in a line and consequently on fissures." "Many margins of craters are formed of beds of tufa, which slope off in every direction." While these islands have been regarded as of very recent formation, some of them are said to exhibit the remains of an older volcanic formation; these indications occur "on Charles Island and the small islands Gardner, Caldwell, and Enderby, which surround it." "The structure of Albemarle,* made up of a series of at least five volcanic centers with the adjacent Narborough, gives us an indication of the probable appearance of the central and western groups of islands were they still active so as finally to become connected and form a huge island, with James, Indefatigable, Jarvis, Duncan, Barrington, and Charles as the culminating points of the plateau, formed by the 100 fathom line. We may therefore look upon the Galapagos Islands as a group of volcanic islands, gradually built up by successive flows of lava upon a huge mound, itself perhaps raised by the same agencies from the floor of the ocean; more active local flows in the same region having at special points built up more rapidly the northern group of islands—Wenman

* A. Agassiz, in Bull. Mus. Comp. Zoöl., Vol. XXIII, No. 1.

and Culpepper, and the two other groups of islands we have recognized."

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"While slowly steaming through the archipelago from island to island we had an excellent opportunity of studying the natural features of these islands, and also as we passed their shores or were dredging within a moderate distance. As far as a cursory examination like ours could prove anything regarding the nature of the geological structure of the islands, our observations fully agree with those of Darwin and of Wolf, that this group presents one of the best examples of true volcanic islands.

"The majority of the islands are evidently formed around a central crater or center of elevation. They have increased in size and in height from successive lava flows. There is nothing to show that the separate islands are entirely the result of the disintegration of a larger volcanic chain, though of course a certain amount of denudation and submarine erosion has undoubtedly taken place, as is readily seen on the slopes of the islands and on examination of the soundings between them. Neither do we find any indications either of elevation or of subsidence of any part of the area of the Galapagos district which would affect their topography; and, as Wolf maintains, we can still less explain their formation by a separation in former periods from the South American continent. On the contrary, every part of their structure seems to prove that the islands have been slowly formed by submarine eruptions at first, and subsequently by similar accretions at the level of the sea, until finally some of the islands have reached an elevation of over 3,000 feet. During the process of growth some of the islands have become joined together, as for instance Albemarle, which is probably composed of three islands originally independent, and also the eastern and western parts of Chatham, which were surely once two separate islands, and are now connected only by a low isthmus.

"The volcanic activity of some of the islands has continued to comparatively very recent times. I am informed by Mr. Cobos that smoke has been seen to issue from Narborough as late as 1836, and it is well known that Capt. Collet was driven from Tagus Cove by the heat due to an eruption on the neighboring Narborough. It is quite probable that the age of the Galapagos does not reach beyond the earliest Tertiary period, and many parts have undoubtedly not been formed before the present epoch, so that the time is geologically short during which so many plants have developed from their South American, their Central American, their Mexican, or their West Indian ancestors."*

CLIMATOLOGY AND FLORAL ASPECT.

As would be supposed, the climatology of these islands is peculiar. Though situated directly on the equator, it is not excessively hot, being

* A. Agassiz.

modified by the comparatively low temperature of the surrounding sea. The rain occurs between February and June, but is very irregular, and often there is none for one or two years. In the higher portions of the islands, about 900 feet, there is often rain all the year. The zone up to between 500 and 600 feet is nearly without rain; therefore the upper region remains always green, the lower is arid and barren. At the edge of the sea various maritime plants occur and in some of the bays mangroves, etc. In ascending the hills from the shore the whole ground in all directions is covered with apparently withered bushes, but on a closer examination it is found that these plants are mostly in bloom. This brushwood grows up to a height of 5 or 6 feet, rarely 10 feet, and here and there are found *Algoroba* trees about 20 feet high, and also sporadic Palosantos (*Guiacum*), the latter being the largest tree in the lower region; it reaches a height of 30 feet and 3 feet in circumference. On places which do not allow the growth of any other plant, the grotesque, tree-like *Opuntias* and gigantic *Cereus* are found. The *Cereus* is generally seen in the most barren spots. These cactuses give a very characteristic appearance to this region. Besides these plants there are some fifty or sixty others, principally shrubby. Then comes an intermediate zone, the vegetation indicating increased humidity; this latter is included between the altitudes of about 650 and 900 feet, and separates the dry and humid regions. This intermediate belt, between 200 and 300 feet in width, is still more covered with brushwood of a withered appearance. The cactuses disappear and a trailing tree moss (*Usnea*) becomes the characteristic feature, and is easily distinguished from a distance by its white color. When the high plateau above the 900 foot line is reached the whole scenery changes; a refreshing, moist breeze comes from the coast; the traveler is surrounded by green woods and stands on meadows. These woods are principally of trees 30 feet high, of an Andean type, and the flora of Ecuador at an altitude of, say 10,000 feet, is suggested at an elevation of only one-tenth as great; there is great resemblance to the small Paramo forests of the Andes, not only in the habits of the trees but also in the small plants which cover the ground, and in the mosses and lichens which cover the trees. The woods are free, without creeping plants, making a passage easy; small meadows occur, consisting nearly entirely of grasses and rushes (*Cyperaceæ*). Above this wooded region another may be seen, which is destitute of trees and covered only with a coarse, short grass, which extends to the highest summits of the islands. (Chatham, Hood, Indefatigable, and James.)

The description of these various zones is based on the conditions found on Charles Island; it is said to be the same on the others of high elevation. From this it is evident that such islands as do not reach to the humid region, like Hood, Barrington, Tower, etc., show only the arid state.

DISTANCES AND DEPTH OF WATER BETWEEN THE ISLANDS.

The approximate distances between some of the islands are as follows:

	Miles.
Hood to Culpepper	270
Chatham to Narborough	163
Hood to Chatham	31
Hood to Charles	40
Chatham to Indefatigable	41
Albemarle to Abingdon	48
Abingdon to Bindloe	14
Bindloe to Tower	31
Abingdon to Wenman	88
Wenman to Culpepper	22
Duncan to Indefatigable	6
Jervis to James	5
Barrington to Indefatigable	11
Indefatigable to James	12
James to Albemarle	11
Charles to Indefatigable	31

"The deepest sounding on record is 671 fathoms (4,026 feet) between Tower and Indefatigable islands; between the Median islands the greatest depth does not surpass 300 fathoms, but a complete series of soundings may show quite different figures."*

Since the above was written by Dr. Baur we have additional data relating to the soundings in Agassiz's† paper, wherein he says:

"Our knowledge of the hydrography of the Galapagos is still quite incomplete. There are unfortunately no soundings between James and Albemarle, to indicate the probable depth of the ridges connecting them. Nothing likewise is known of the depth of the channels between Abingdon and Bindloe and Tower, and no soundings exist to show how far to the westward the deep valley (of over 800 fathoms) separating Bindloe from Indefatigable extends, as there are no soundings between either Bindloe or Abingdon and Albemarle. There seems little doubt that the northernmost islands, the isolated rocks of Culpepper and Wenman, are themselves separated by comparatively deep water, and in turn separated from the northeastern group of islands, Abingdon, Bindloe, and Tower, by a tongue of the ocean of at least 1,000 fathoms in depth and from 60 to 70 miles in width. From a careful examination of the soundings thus far made it seems probable that the 100-fathom line connects Indefatigable, Duncan, Barrington, and Charles, and that there is also a connecting ridge inside that same depth between those islands and Albemarle to the southeast of Cape Woodford on Albemarle, or a wider plateau of which Duncan Island is one of the culminating summits.

"A comparatively shallow connection may also exist between Cape

* Baur's paper, Am. Nat., 1891.

† A. Agassiz in Bull. Mus. Comp. Zoöl, Vol. xxiii, No. 1.

Nepean, on James Island, and Albemarle in the direction of Cowley Island, Narborough itself being only separated from Albemarle by a channel less than 75 fathoms in depth. The soundings between Chatham, Barrington, and Hood are so few in number that we are not yet able to decide whether these southeastern islands, Chatham and Hood, are not perhaps connected by a ridge connecting Hood and Macgowen Reef, and also uniting them with the great plateau which the islands of Barrington, Charles, Indefatigable, Duncan, Albemarle, Narborough, and perhaps James have gradually built up.

"But it may be that the tongue of deeper water extending between Hood and Chatham runs toward Barrington, and also separates that island from Chatham."

Agassiz further on says: "On account of the small number of soundings, no attempt has been made to draw curves of depth on the chart of the Galapagos."

ORIGIN THROUGH SUBSIDENCE.

The position of Baur is that "*the Galapagos are continental islands, originated through subsidence;*" they all formed at a past period one large island, and this island itself was at a still former period "in connection with the American continent." This is in direct opposition to the opinions of "Darwin, Hooker, Salvin, Grisebach, Englar, M. Wagner, Wallace, Peschel, and later by Wolf, and Agassiz, as herein quoted. All declare that these islands are of recent volcanic origin, that they have emerged out of the sea through volcanic activity, and have become peopled from the continent," etc. "Henri Milne Edwards alone holds a different opinion; he believes that the Galapagos represent the remains of a former continent, and in this opinion I agree." He then proceeds by saying that "the principal reason of the believers of the elevation theory is the volcanic condition of the islands. But I do not see any difficulty in that. If mountain ranges like the Himalayas, the Alps, the Andes, the Rocky Mountains, could be elevated thousands and thousands of feet, why could not subsidence take place in other places? If Central America should disappear by and by through subsidence, the result would be that the tops of the highest mountains would form volcanic islands, some with still active volcanoes. This would be exactly the condition we see to-day in the Galapagos. I think, therefore, that the volcanic nature of a group of islands is no positive proof of its recent origin. Such groups of islands can be just as well considered as formed of the tops of the volcanic mountains of a sunken part of a continent." * * *

"I believe, therefore, that the peculiar genera we find to-day on the Galapagos have not originated there, but have been preserved in their old condition." *

* Dr. Baur in Am. Naturalist, April, 1891.

ORIGIN OF FAUNA AND FLORA.

Dr. Baur's contention arises from the hypothesis that only subsidence can explain what he terms the harmonic distribution of animal and plant life. He says further on, "that we need only an elevation of about 10,000 feet to connect the Galapagos with America." The peculiarities of the flora which he points out and which are referred to elsewhere in connection with the arid and humid zones (ante, page —, he regarded as explicable only by the theory of subsidence; but it seems to me they are fully as well explained in Agassiz's paper, and so far as the alpine facies of the flora is considered, it may fairly in this respect be compared to that of the rainless belt of the South American mainland 600 miles to the eastward, and the modifying influences of cold on one side and drouth on the other may be regarded as producing analogous results in dwarfing and otherwise differentiating vegetable life. The theory of subsidence he assumes will explain all these, as well as similar and other phenomena which I have not referred to, "in an absolutely easy manner." It is very doubtful, however, in the present state of our knowledge, whether this, that, or the other theory will satisfactorily explain *all*, but that theory which will fairly explain a good portion, by those factors or agencies that are operating directly under our eyes, would seem to be preferable and entitled to acceptance over another, however plausible and attractive, that involves conjectural and remoter conditions. It seems to me that anyone who has given much thought and attention to the study of the geographical distribution of species, and has pursued it to such an extent as to justify the term investigation, upon a glance at any good map that presents the breadth and range of the great Peruvian current, its velocity and direction, and the contributing influence of the Mexican as well as the Panamic current, which latter no doubt is an important factor, and these combined including in their sweep and embrace the various islands which form this peculiar group, will readily perceive the geographical origin of the species that now inhabit them and the direction from which these islands were stocked or peopled. To the continuous or uninterrupted influence of these rivers in the sea, operating without intermission through indefinite centuries, as well as to the persistent agency of trade winds, storm winds, and more transient aerial currents, we may find a solution, or key, to say the least, to the greater part of the phenomena, without resorting to topographic displacement or modification of the sea bed of 10,000 to 12,000 feet elevation to explain the few that are less easy or more difficult of explanation.

MARINE MOLLUSKS.

Of the marine shells (257 species) less than half a score* are indigenous; of these some, if not all, may prove upon a better knowledge of the mollusks of the shores of Central and South America to belong

* Not inclusive of dredged or deep water species.

to the mainland. Our knowledge of the marine species along the South American coast is not by any means satisfactory The collection made by Dr. Jones, of the U. S. Navy, which embraced 211 West coast species, carried 90 of them from 100 to 3,195 miles farther south than previously reported. *Tectarius*, of the *Litorinidæ*, previously detected at Hood and Bindloe by Dr. Habel as listed by Wimmer, was subsequently found at Manta, Ecuador by Dr. Jones,* and it is not unlikely that others now regarded as peculiar to the Galapagos may prove to be mainland forms. Attention is called to my remarks in the catalogue on *Omphalius Cooksoni* Smith and its close resemblance to, if not identity with, the Antillean *O. fasciatus*.

The number of species, however, that exhibit intimate relationship with Antillean-Caribbean forms, is quite small and inconspicuous, when placed side by side with the West American types.

DRIFT MATERIAL.

Pertaining to the drift material, its quantity and occurrence, the testimony of the sea bed claims special consideration. Referring to the "character of the bottom deposits," Agassiz remarks: "Nearly everywhere along our second line of exploration, except on the face of the Galapagos slope, we trawled upon a bottom either muddy or composed of Globigerina ooze, more or less contaminated with terrigenous deposits, and frequently covered with a great amount of decayed vegetable matter. We scarcely made a single haul of the trawl which did not bring up a considerable amount of decayed vegetable matter, and frequently logs, branches, twigs, seeds, leaves, fruits, much as during our first cruise.

"I was struck, while trawling on our second line between the Galapagos and Acapulco, to observe the great distance from shore to which true terrigenous deposits were carried. There was not a station there occupied of which the bottom could be characterized as strictly oceanic. At our most distant points from shore the bottom specimens invariably showed some trace of admixture with terrigenous material. A very fine mud was the characteristic bottom brought up * * * from depths of 2,000 fathoms. This mud continued all the way from the Galapagos to Acapulco, and up to the mouth of the Gulf of California, where it became still more an impediment to dredging, so that little work was done until we passed the Tres Marias. Even then the trawl was ordinarily well filled with mud, and with it came up the usual supply of logs, branches, twigs, and decayed vegetable matter. On going farther north, into the Gulf of California, the nature of the bottom did not change materially from what it had been along the coast," etc.

* List of shells collected on the west coast of South America, principally between latitudes 70° 30′ S. and 8° 49′ N., by Dr. W. H. Jones, U. S. Navy. Proc. U. S. Nat. Mus., Vol. XIV, pp. 307–335, 1891.

* * * "In the dredgings of the *Blake* in the Gulf of Mexico, off the West Indies, and in the Caribbean, my attention had already been called to the immense amount of vegetable matter dredged up from a depth of over 1,500 fathoms on the lee side of the West India Islands. But in none of the dredgings on the Atlantic side of the isthmus did we come upon such masses of decomposed vegetable matter as we found on this expedition. There was hardly a haul taken which did not supply a large quantity of water-logged wood, and more or less fresh twigs, leaves, seeds, and fruits, in all possible stages of decompositions." * * *

WEST AMERICAN CURRENTS.

Again referring to Agassiz, he says: "The course of the currents along the Mexican and the Central and South American coasts clearly indicates to us the sources from which the fauna and flora of the volcanic group of the Galapagos has derived its origin. The distance from the coast of Ecuador (Galera Point and Cape San Francisco) is in a direct line not much over 500 miles, and that from the Costa Rica coast but a little over 600 miles, and the bottom must be for its whole distance strewn thickly with vegetable matter, which, as I have already stated, came up in great masses in almost every haul of the trawl. This was especially noteworthy in the line from the mainland to Cocos Island, and certainly offers a very practical object lesson regarding the manner in which that island must have received its vegetable products. It is only about 27.5 miles from the mainland, and its flora, so similar to that of the adjacent coast, tells its own story." "The velocity of the currents in the Panamic district is very great, sometimes as much as 75 miles a day, so that reeds, fruits, masses of vegetation harboring small reptiles, or even large ones, as well as other terrestrial animals, need not be afloat long before they might safely be landed on the shores of the Galapagos. Its flora, as is well known, is eminently American, while its fauna at every point discloses its affinity to the Mexican, Central, or South American, and even West Indian, types, from which it has probably originated; the last indicating, as well as so many of the marine types collected during the expedition, the close connection that once existed between the Panamic region and the Caribbean and Gulf of Mexico; a connection once extending, probably, through deep and wide passages all the way from the northern extremity of Colombia, the Isthmus of Panama, Costa Rica, and as far north as the Isthmus of Tehuantepec."

TERRESTRIAL MOLLUSKS.

The land shells are principally of a Bulimoid type and of a distinctly American aspect. One of the twenty or more so-called species, *Bulimus achatinellinus* of Forbes, has in the brightness of its coloration,

its color markings, and the sheen and smoothness of its surface a close resemblance to some of the Polynesian *Achatinellas;* but it lacks the chief and constant character of the Achatinellas, viz, the ever-present and persistent twist of the columella at its base. As may be seen upon examination of the tabulated list hereunto annexed, the land shells therein are assigned definitely to *only eight* of the islands, viz: Albemarle, Indefatigable, Barrington, Charles, Hood, Bindloe, James, and Chatham. It is greatly to be regretted that our knowledge of the terrestrial mollusks of the group is so exceedingly limited. What might be the result of a systematic investigation, island by island, and zone by zone, and the environmental peculiarities, general and local, carefully observed and noted, we can barely conjecture; but we are warranted in assuming from the testimony of the limited material under review, and what is known of the relation of environment to variation in the land shells in other parts of the world, that an ample collection under the conditions above mentioned would be of very great value to the biologist and full of interest from a more general scientific point of view.

The various species of Galapagos land shells are in the main of dull, unattractive colors; this might be supposed when the circumstances of their occurrence are considered. Of a few of the species the collector noted the peculiarities of station, and we read of this or that species as occurring "under scoriæ," "under lava," etc.; again of *B. nux*, which exhibits extreme variability and is apparently the most numerous in individuals, as being found "on bushes" or upon or under lava. To the student who has this material, or this class of material, before him these few brief notes are especially suggestive, and remind him of the exceeding variability frequently exhibited within the compass of a comparatively limited area. An investigation of the higher altitudes of those islands that attain an elevation sufficient to include the "intermediate belt 200 and 300 feet in width," what may be called the *white zone* or zone of *Usnea*, and, still higher, the plateau region or *zone of green* woods and meadows, would doubtless show that said zones were inhabited each by its own peculiar species and color types, characteristic of or to the zone, peculiar and characteristic in external facies at least, such as color and sculpture, if not strikingly or materially different in that of form. In the upper or *green zone* it might be found that the mollusks were arboreal in their habits, of bright colors, like Forbes's *B. achatinellinus* heretofore mentioned, and like the more showy of the numerous species of the Sandwich Island *Achatinella*,* which inhabit a similar station.

The land shells, as before stated, are definitely referred to eight of the islands. So our knowledge of the marine species is restricted to eight,

* The dull-colored species of this Polynesian group of shells live generally, if not exclusively, on the ground or near it—that is to say, are not arboreal, as I was informed by my esteemed friend the late Dr. Newcomb many years ago.

viz: Hood, Albemarle, Charles, Duncan, Bindloe, James, Chatham, and Indefatigable.

It may be said perhaps that the presence of the marine mollusean forms of the West American coast is much less difficult to account for than either of the other faunal elements.

DISTRIBUTION OF TERRESTRIAL SPECIES.

The distribution of the terrestrial species both by fluviatile and marine currents as well as by aerial forces is easily explained. It includes necessarily a consideration of the vitality of these animals as well as of their eggs.

Binney,* referring to the introduction of foreign species into the United States, says: "Oceanic currents also aid in bringing to our shores foreign species, and have been the means of introducing and naturalizing them. The Gulf Stream is a prominent example of this. This great body of water, flowing from the Gulf of Mexico into the Atlantic, passes between the peninsula of Florida and the island of Cuba, and after turning the southern point of Florida sweeps along its eastern shore. It is sometimes driven close to the northern coast of Cuba, and sometimes forced much farther north, according to the direction and force of the wind. Various countercurrents, due also to the influence of the wind, diverge from the main stream, among which is noticed a current, which, after a northerly wind has prevailed for several days, sets in a southwesterly direction near the Florida Reef. The principal stream and the currents originating in it bear upon the surface various vegetable and other productions brought by rivers into the Gulf or swept from its shores, and these are frequently deposited upon parts of the coast very distant from their origin. In this way seed vessels from the Spanish Main, trunks of trees, and fragments of wood of unascertained origin, and numerous objects from the northern shore of Cuba are frequently found on the shore of Key West and on the beach of Cape Florida and the shores and islands to the north of it.

"A few years since a bottle was picked up on Tavernia Key, near Cape Florida, containing a note stating that it was thrown overboard off the Moro Castle. A Cuba barge, of the kind used in lading and unlading vessels in Matanzas, was lately found stranded on the beach at New River, 25 miles north of Cape Florida. Small objects from Cuba are often found on the shore of Key West.

"These circumstances are adequate to account for the transmission of land shells from the island of Cuba, and even from more distant places, to the mainland and islands of Florida; and to this source we ascribe the origin of *Helix rhodocheila*, and *Bulimus virgulatus*, which

* Terr. Moll. and Shells of the United States (A. Binney) Vol. 1, 1851, p. 152 *et seq.* (edited by A. A. Gould).

are probably derived from the Bahamas, but possibly from the Spanish Main, and of *Helix ottonis*, *Bulimus fasciatus*, *B. zebra*, *B. subula*, *Pupa incana*, *Cyclostoma dentatum*, and *Cylindrella lactaria*, all undoubtedly from Cuba, which, having found a congenial soil and climate in the southern part of the peninsula of Florida, are now flourishing there in great numbers. To the same cause may possibly be due the passage of some of the smaller species, of universal diffusion in the United States, to the island of Cuba. Among these are *Helix minuscula*, *Pupa contracta*, and *P. rupicola*, which from their general distribution on the continent may be supposed to have originated there rather than upon the island.

"We can not help thinking, too, that such currents have had some agency in introducing *Helix hortensis* on our northeastern coast at some former period, although we are not aware of the existence of one capable of producing such an effect."

FRESHETS AND OCEAN CURRENTS.

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"That this hypothesis of the agency of currents is no violent one, is proved by common experience. A single log of timber, removed from the bank of a river by the rise of its waters during a *freshet*, and borne by them to the ocean, and driven by winds, tides and currents, might carry with it and deposit upon other shores the eggs of mollusks, or even the living animals themselves, provided they were not too long exposed to the elements. It is difficult to estimate their powers of endurance under such circumstances, or to limit the amount of exposure which they might bear, but they are unquestionably such as to enable them to sustain life for several days, in the case we have supposed. Logs and trunks of trees which have drifted from a great distance may often be seen upon our sea beaches; and we remember, on one occasion, to have seen Nantasket beach, at the mouth of Boston harbor, strewn with logs which had been driven from the rivers of Maine by easterly winds of several days' continuance."

EXTRAORDINARY SEASONS.

During the extraordinary winter of 1861–'62, when the interior valleys of California and the other seaboard regions of the west coast were turned into lakes through excessive rainfall in the lower altitudes and the melting of the previous snowfall in the higher regions of the mountains, for weeks the rivers were unable to carry off, within the capacity of their ordinary channels or drainage troughs, the enormous volume of water; every brook became a river, and the rivers were changed into raging torrents, undermining the banks, cutting new paths, and sweeping along on the way to the sea, forest trees of a century's growth, which were carried far into the ocean and borne

hither and thither by the currents and the winds. The greater part after drifting hither and yon were ultimately swept landward again by the prevalent westerly or northwesterly winds, and piled up helter-skelter upon the beaches all along the coast, forming a complete labyrinth and tangle or mesh work, of frequently enormous strands, and in the majority of cases absolutely concealing the beach itself for its entire width, from the water's edge to the extreme upper limit of the highest drift line.

Recent (December, 1892) west-coast papers say: "The *Wolcott* reports that in the recollection of seafaring men on the coast there has never been so many drift logs in the Straits of Fuca as at the present time. The high freshets have swept down the fallen logs of ages and sent them adrift to the sea. Logs that have been buried in the sand for years along the beach below Port Crescent have been washed up, and in some places great dams of logs are formed, rendering it dangerous for navigation."

AGENCY OF RIVERS, ETC.

Hooker, while discussing (Trans. Lin. Soc., 1851, Vol. XX, p. 163) the affinities of the flora of the Galapagos and its origin, lays great stress upon the action of the currents coming north from the Guyaquil River, and those flowing westward from the Bay of Panama, as agents for the distribution of South and Central American plants. Speaking of the affinities of the plants of the Galapagos he says: "The new species being for the most part allied to plants of the cooler parts of America or the uplands of the tropical latitudes, the more peculiar are the same as observed chiefly in the hot and damper regions, as the West Indian Islands and the shores of the Gulf of Mexico."*

Again, referring to the extraordinary winter of 1861–'62 in California, or more properly in the Pacific seaboard States, it will be seen at a glance that with westerly currents and not unfavorable winds the drift trees and logs brought down by the streams would have been swept on and borne elsewhere, instead of being piled up along the beaches of Oregon and California, or would have continued to drift until they became water-logged and sunk. Nor was the havoc made in the forests caused chiefly by the main streams. Streams no larger than Russian, Smiths, and Klamath Rivers, of insignificant volume in ordinary years, were changed into devastating torrents and contributed largely to the general destruction.

In Chile there are between twenty and thirty streams of from 70 to over 200 miles in length, rivers of rapid descent, that drain off and carry more or less directly to the sea the water resulting from the melting snow of the Andes. The ordinary volume of these rivers is sometimes enormously increased by the winter rains, and occasionally a

* Quoted by A. Agassiz, as previously indicated.

winter or rainy season occurs of unusual and extraordinary precipitation when the swollen currents exhibit torrential energy.*

Peru has numerous streams in common parlance of insignificant proportions and of little value for other than irrigating purposes. These, too, in seasons like the above, become important by reason of the damage resulting from their catastrophic action.

And still farther to the north, along the westerly slopes that drain into the Pacific, we may reasonably assume contributions are made to the general drift material that rivers ordinarily carry to the sea, and which, being within the range and influence of the west Mexican current, are likely ultimately, in part at least, to be borne seaward along its westerly course.

A single tree of large size might carry with it not only molluscan and insect forms mature, living, or in the egg, of several species, but also living individuals of many vertebrate forms that found refuge or safety upon it, somewhere along its course from its native forest home to the point where it found final lodgment, or was cast ashore; thus if the environmental conditions were at all favorable, would be planted the foundation of a colony which would extend its territory so far and in such directions as were most congenial. The area of surface above the water furnished by the main trunk of such a tree, and the drift consisting of various material entangled in and among its branches, would be amply sufficient in the matters of space and security, for the transportation of many animal forms; of these such as possessed sufficient vitality to successfully meet the contingencies of the voyage in the way of hunger, thirst, etc., would become the progenital stock in new regions more or less distant from their original haunts, where, under the steady but moderate pressure of new environmental conditions, in the course of generations a new *facies* would be gradually brought about, developed in or given to the more plastic, and we should have what are called new species.

GENERATIVE CAPACITY AND VITALITY OF LAND SNAILS, ETC.

The prolific generative capacity of the land snails and their extreme tenacity of life are to be considered in connection with their geographical distribution and establishment in new areas under the circumstances and conditions described above, as well as in the matter of probable aërial distribution, which last has never received sufficient consideration as playing an important part, or any part whatever, as an agency in dispersing or distributing animal life or extending specific areas or creating new ones remote from those previously existing.

"The number of eggs produced varies in the genera and species," says Binney, "in the same proportion as the dangers to which they

* It was the occurrence of such a winter as this that destroyed the botanical garden of my friend the late Thomas Bridges, whose establishment was within flood range of one of these Chilean streams.

are exposed are greater or less. Thus in the *Limacidæ*, whose means of protection and whose chances of preservation are much less than those of the *Helicidæ*, the number is much greater than in the latter. The number of eggs produced by two individuals of *Limax agrestis* kept in confinement by Dr. Leach was, in the course of rather more than a year, seven hundred and eighty-six. It usually amounts to at least three hundred per annum. The other species, though not equally prolific, multiply greatly; and each pair of the various species of *Helicidæ* produces, annually, from thirty to one hundred eggs, and perhaps more. The young of the *Limacidæ* complete their growth and reproduce their kind sometimes within the year of their birth, and always as soon as the second year; and the species of the other families are believed not to require a much longer time to attain maturity. This rapid increase replaces the numbers annually destroyed, and maintains the species in their relative importance.

"Their extreme tenacity of life is manifested in every stage of growth from the egg to the mature animal. In the northern part of the United States we have frequently observed the eggs of the *Helicidæ* in the forest covered with snow, protected only by a single leaf, where they had remained through the winter months, constantly exposed to a temperature much below the freezing point. The *Helicidæ* themselves withstand the cold of the severest winters in the same situations, and *Succinea* has been frozen in a solid block of ice and yet escaped unharmed. Helices when frozen in a state of confinement, though they sometimes recover so far as to move about with some activity, usually survive but a short time.

* * * * * * *

SUBSISTING WITHOUT FOOD.

"The great length of time they can subsist without food is another exemplification of their great tenacity of life. Those species, especially which live in dry and exposed situations, have the power of endurance to a remarkable degree. A friend received specimens of *H. desertorum* which had been collected in Egypt, had been shipped to Smyrna, thence to Constantinople, thence to Rio Janeiro, and finally to Boston, occupying a period of about seven months, which appeared in full vigor when taken from the papers in which they had been enveloped. They were laid away in a drawer, and on being examined three years afterwards some of them still came out in tolerable vigor."

Further instances of the extraordinary vitality of the land snails have come under my own observation, and these are more directly pertinent because the species referred to are West American, and inhabit areas where the physical features are more nearly like those of the South American mainland, and that particular zone of the same from whence no doubt the Galapagos islands were originally stocked.

In December, 1865, the Stearns collection, now in the National

Museum, was enriched by the acquisition of several examples of *Helix Veatchii** Newcomb, that were collected by Dr. Veatch on Cerros or Cedros Island off the coast of Lower California in 1859. The specimens were given by Dr. Veatch to Thomas Bridges, and upon the death of the latter came into my possession with the remainder of the Bridges shells. One day upon a careful examination I discovered that one of the specimens was apparently still alive, and placed it in a box of moist earth; after a while it protruded its body from the shell and commenced moving about and seemed to be no worse for its long fast of at least *six years*. *H. Veatchii*, it will be observed, beat the time of the famous British Museum example of *H. desertorum*, which lived without food within a few days of *four years*. In March, 1873, Prof. George Davidson, of the United States Coast Survey, while at San José del Cabo, Lower California, collected a number of specimens of *Bulimus pallidior*, and subsequently gave me a part of them, which I put in a box, where they remained undisturbed until June 23, 1875, when they were placed in a glass jar with some chick-weed and a small quantity of tepid water. They soon waked up and began to move about apparently as vigorous as ever after their long nap of *two years two months and sixteen days*. In connection with the foregoing it should be borne in mind that at the commencement of hibernation the land snails seal up the aperture of the shell with a close-fitting shield or epiphragm; this consists usually of thin transparent mucus, at other times, and more especially with those forms that inhabit arid regions, of an opaque membranaceous matter of the thickness of thin card board; the animal protects itself still further by other and interior epiphragms, that, like so many partitions, still further protect them against prolonged or excessive heat or aridity. It should also be noticed that color also has some place in this connection, for although most if not all of the land shells that inhabit hot, arid, or sterile regions, seek protection from the heat by burrowing, the prevailing color of such species is white or whitish, rather than dark or black; the first reflecting the heat instead of absorbing it, as is the case with the latter. It may be that sufficient or perhaps too much space has already been given to these incidental or secondary matters, nevertheless before leaving this aspect of the subject the following from Woodward† is worth quoting:

FURTHER INSTANCES OF TENACITY OF LIFE.

"The fresh-water molluscs of cold climates bury themselves during winter in the mud of ponds and rivers; and the land snails hide themselves in the ground or beneath moss and dead leaves. In warm climates they become torpid during the hottest and driest part of the year. Those genera and species which are most subject to this 'sum-

* Now regarded as a variety of *H. arcolata*.

† Recent and Fossil shells.

mer sleep' are remarkable for their tenacity of life; and numerous instances have been recorded of their importation from distant countries in a living state. In June, 1850, a living pond mussel was sent to Mr. Gray from Australia, which had been more than a year out of water. It was alive four hundred and ninety-eight days after it was taken from the pond, and in the interim had been only twice for a few hours in water, to see if it was alive.

"The pond snails (*Ampullariæ*) have been found alive in logs of mahogany from Honduras (Mr. Pickering), and M. Cailland carried some from Egypt to Paris, packed in sawdust. Indeed, it is not easy to ascertain the limit of their endurance; for Mr. Laidlay having placed a number in a drawer for this purpose, found them alive after five years, although in the warm climate of Calcutta. The Cyclostomas, which are also operculated, are well known to survive imprisonments of many months; but in the ordinary land snails such cases are more remarkable. Some of the large tropical Bulimi, brought by Lieut. Graves from Valparaiso, revived after being packed, some for thirteen, others for twenty months. In 1849 Mr. Pickering received from Mr. Wollaston a basketful of Madeira snails (of twenty or thirty different species), three-fourths of which proved to be alive after several months' confinement, including a sea voyage. Mr. Wollaston has himself told us that specimens of two Madeira snails (*Helix papilio* and *tectiformis*) survived a fast and imprisonment in pill-boxes of two years and a half, and that a large number of the small *Helix turricula*, brought to England at the same time, were all living after having been inclosed in a dry bag for a year and a half."

THE AGENCY OF THE WINDS.

The distribution of plants through the agency of the winds, by means of which the seeds are dispersed and borne directly or indirectly to great distances, has been recognized for years and years, while the same distributive factor as operating in the dissemination of animal life has scarcely attracted attention or received the recognition it deserves. Showers of "sulphur" have frequently been reported at a distance of 200 miles or more to the westward of the Atlantic seaboard where the yellow pollen of the pines standing in the barrens of New Jersey has fallen and been deposited, in many places, to a perceptible depth. Showers of dust or sand from the desert of Southern California are swept northerly or westerly for great distances, first carried to a high altitude by the ascending column of heated air, and the desert sands of Sahara are sometimes lifted by similar means and carried northward from Africa across the Mediterranean.

Squids and fishes, inhabitants of the sea, that have been carried up by waterspouts are borne landward by storm winds or gales, and fall to the earth in distant places, to the astonishment of the intelligent as well as the superstitious, and the cyclone, so called, or hurricane of the

Indian seas and elsewhere, sometimes of several hours' duration and of terrific force, must, in the nature of things, include in the material uplifted and swept before them, animate as well as inanimate objects. No part of the earth's surface, probably, is free from the occasional visitation of these violent storms, though their occurrence is much more frequent in some regions than others. "Volcanic dust," from the eruption of a volcano on the island of St. Vincent, West Indies, fell on an island 95 miles to the windward in such quantities that trees were crushed to the earth by the weight of the mass."* The eggs of most snails are not heavier than particles of volcanic dust or desert sands or, perhaps, the pollen of the pine, and may be moved separately or as attached, either to aerial drift or the current drift of the sea.

The more general region which includes within its area the Galapagos is said to be free from severe storms; it is highly probable, however, that in the course of years storms of great severity do occur, and it is quite unlikely that any portion of the earth's surface is absolutely exempt from occasional visitations of this character. With the high velocity that not infrequently marks severe meteoric disturbances, a storm of very short duration would be sufficient to carry literally on "the wings of the wind" plant seeds as well as the minute eggs of animals or the larvæ of insects over distances no greater than that between the Galapagos and the mainland.†

I have quoted, in the main literally, from Baur, Agassiz, Binney, etc., in order to present to the reader, more particularly the student interested in the study of the Mollusca, the more important physical features exhibited in this interesting group of islands, their geographical isolation remote from the mainland of the American continents, their still greater distance from any of the Polynesian islands, as well as the more local physical characteristics, and the difference observable among the various islands when brought into comparison one with another.

Class PELECYPODA.

Family OSTREIDÆ.

Genus **OSTREA** Linné.

1. Ostrea folium Gmel.

Two valves; different individuals.
James Island.

* Dr. Sharp, in Proc. Acad. Nat. Sci. Phila., 1890.

† The Paumotu group, supposed to be entirely outside of the cyclone belt, which includes the Samoan and Fiji groups, was swept by a fierce cyclone in 1878; and the same storm extended to the Society Islands. The oldest natives had not even a tradition of such a storm occurring before in the Paumotus.

While reading the proofs of this paper the daily papers have contained notices of a disastrous hurricane on the coast of Chile, by which the mole at one of the nitrate ports was carried away and damage at this point was done to the extent of $150,000.

These valves evidently belong to a species that inhabits the littoral zone, and to examples that inhabit the upper belt of said zone, and fasten upon small stones or to the roots of mangroves or some other shore-inhabiting shrub. Of the many species that have been described from the west coast quite likely one-half are synonyms.

The form of individual examples, as well as of the several individuals that constitute a colony, is so dependent upon the object to which the individual or the mass is attached, that a satisfactory diagnosis is out of the question with anything less than a large series and a multitude of specimens.

Wimmer credits one of Gould's species, *O. glomerata* (*vide* Reeve's Monograph Conch., Icon., Figs. 52, a, b, c, d), to the Galapagos, but Reeve makes no reference to any species of oyster in these islands, and it may therefore be assumed that in the Cumingian collection these islands were not represented. *O. glomerata* is, for an *Ostrea*, a rather well-characterized species, and Reeve's figures are in this instance particularly good, so that it may be assumed that Wimmer's determination, if made from direct comparison with Reeve, is most likely correct; nevertheless I am disposed to doubt the presence of *glomerata* in the Galapagos until confirmed by further testimony or additional material. *O. glomerata* is rather an Indo-Pacific form, extending northerly and westerly to the islands of Japan. It is probable that Gould's *mordax*, collected by ("Wilson's Expedition" in Reeve, in error for) Wilkes's Expedition, and doubtfully assigned to California, is really a West Coast form; by some authors it has been regarded as a synonym of "*glomerata*." I can conceive of varieties of *mordax* closely approaching "*glomerata*," but in general features only.

Family ANOMIIDÆ.

Genus Anomia Linné.

2. Anomia adamus Gray.

=*A. Lampe* Gray, variety.

One left valve, beach, in good condition.

James Island.

Of the numerous alleged species figured in Reeve, *A. adamus* is the only one credited to the Galapagos, where Cuming obtained the example described by Dr. Gray near Lord Hood's Island, at the depth of 9 fathoms, attached to "*Avicula margaritifera*." If the description had been without the habitat, I should have recorded the specimen herein listed under the name of *A. lampe*, the latter being familiar to collectors generally, and usually attached to the species in collections.

In the Proceedings of the Zoölogical Society of London for the year 1849, Dr. J. E. Gray described (pp. 116, 117) seven species from the west coast of the Americas, including the foregoing, to wit: *fidenas*, *pacilus*, *larbus*, *alectus*, and *hamillus*. Dr. Carpenter, in his Check-

List of West Coast Shells, includes *lampe* and *fidenas;* the latter is described by Gray as "flat, smooth externally," etc. It is possible that *larbus* from Payta may be a distinct species, but I doubt it. Like *fidenas*, it is described as "smooth;" but neither color, sculpture, form, whether exhibited in outline, convexity, or flatness, are of any permanence or of much value as diagnostic characters in this group; form, as to outline, convexity, or flatness, is entirely dependent upon the object which the individual *Anomia* has fastened upon. If it happens to be a *Pecten*, then the ribbing which characterizes the scallop shells is reproduced in the *Anomia*. If the young *Anomia* fixes itself in a deep or shallow concavity, or upon the surface of a slight or pronounced convex object, the shell in the course of its growth will be molded accordingly. Where they fasten upon large, smooth cobbles, in a sheltered nook of the coast, protected from rough seas, they are usually flatter and of more even and regular growth. Neither are the muscular scars to be depended upon, as a valid character for species-making, as anyone can see who has a sufficient quantity of material and will compare the same with Gray's descriptions before him. Carpenter, as before noticed, has adopted *lampe* and *fidenas;* these may for convenience be retained, the latter for the smooth variety, the former for the standard and usual examples, while the remainder of Gray's names may follow in the order of synonyms.

Family PECTENIDÆ.

Genus **PECTEN** Müller.

3. Pecten subnodosus Sby.

Four right and one left valves, all juniors and in good condition (Mus. No. 102519).

James Island.

The examples are from 1¾ to 2 inches high and have twelve to fourteen ribs.

Family LIMIDÆ.

Genus **LIMA** Bruguiere.

4. Lima arcuata Sby.

One broken valve.

James Island.

Family AVICULIDÆ.

Genus **PERNA** Bruguiere.

5. Perna Chemnitziana Orb.

= *Isognomon Chemnitzianum* Auct.

Two beach valves, one from each place.

Indefatigable and Hood islands.

Wimmer's list includes *I. legumen* Gmel. and *I. quadrangulare* Reeve, but it will be admitted by anyone familiar with the shells of this

genus that the determination must be more or less arbitrary. The *Albatross* specimens do not differ essentially from the Panama and Gulf of California form, which both C. B. Adams and Philip Carpenter determined as Orbigny's species. It is probably the same as *flexuosa* Sby., as stated by Carpenter, to whose comments in the "Mazatlan catalogue" reference is suggested.

Family MYTILIDÆ.

Genus **MYTILUS** Linné.

6. Mytilus multiformis Cpr.

Valves, beach (Mus. No. 102353).

Hood Island.

This species was described by Carpenter from Mazatlan shells, and the Galapagos valves are apparently identical. Dr. Jones detected perfect examples and odd valves of *M. cuneiformis* (=*M. angustanus Rve.*) at Chatham Island.

Genus **SEPTIFER** Recluz.

7. Septifer Cumingianus Dkr.

One valve, beach (Mus. No. 102352).

Hood Island.

Cuming collected this species at Panama and Carpenter includes it in his Mazatlan list.

Genus **MODIOLA** Lamarck.

8. Modiola capax ? Cpr.

One example, very small, beach.

Hood Island.

Probably, but not certainly, the above species, which is credited to the Galapagos in the Cuming collection now in the British Museum.

Family ARCIDÆ.

Genus **ARCA** Lamarck.

Subgenus **BYSSOARCA** Swainson.

9. Arca (Byssoarca) solida Sby.

Valves, beach (Mus. No. 122131).

Indefatigable Island.

10. Arca (Byssoarca) gradata Brod. & Sby.

Valves on beach.

James, Hood, Indefatigable, and Chatham islands.

Three perfect valves from James Island, one in good condition from Chatham, and one broken valve from Indefatigable; also one from Hood Island.

11. Arca (Byssoarca) Reeviana Orb.

Common, beach, valves.

Hood Island, common on beach. Indefatigable Island, thirteen odd valves, and James Island twenty-three valves, on beach.

This species is quite constant in sculpture of both hinge area and and exterior surface of valves, and the hinge teeth are characteristic and quite persistent; the outline of the valves is variable, as the byssal foramen is often carved out nearly exclusively from one valve. The largest example measured 4 by 2¼ inches.

Family CARDITIDÆ.

Genus **CARDITA** Bruguiere.

Subgenus **Venericardia** Lamarck.

12. Cardita (Venericardia) flammea Michelin 1830.

= *C. flammea* Auct.
+ *C. varia* Brod 1832,
+ *C. tumida* Brod.
= *Actinobolus flammeus* Auct.

Valves, beach.

Common on James Island where numerous, principally right, valves were obtained; three valves Hood Island. Reeve says that "it is with no little gratification that I now publish a good illustrative figure of a species described thirteen years since by M. Michelin from a worn odd valve. The *Cardita varia* is the nearest allied species to it, but that shell is of smaller dimensions, rounder and slightly noduled; the painting is also of a different character."

After a careful comparison I feel warranted in uniting the three species as above under Michelin's name. I am quite familiar with these forms and the color distinction is of no value. These shells vary considerably in the other characters to which Reeve refers; but in the essential features of outline, growth, zones, etc., from adolescence to maturity, as well as in the number of ribs and the hinge characters, they are identical.

Family LUCINIDÆ.

Genus **LUCINA** Bruguiere.

13. Lucina bella Conrad.

One good example, beach; (Mus. No. 122112) also valves; abundant.

The first named from Chatham Island. Abundant on Hood Island; two left and one right valve and one perfect fresh specimen from Indefatigable Island. I am inclined to regard Carpenter's *L. pectinata* Maz. catalogue sp., 142, as a varietal aspect of this species. The *fibula* of Wimmer's list is probably this species. Carpenter, in Brit. Assn. Report 1863, says "Conrad's *bella* may be=*pectinata*."

Family CHAMIDÆ.

Genus CHAMA Bruguiere.

14. Chama echinata Brod.

Valves, beach.
Indefatigable and James islands.
Five odd valves, juniors from the former and one probably of this species from the latter island.

15. Chama frondosa Brod.

Valves, beach.
Several odd valves, generally in poor condition from James and two from Hood Island. This species is common at many places on the main land of South America; it is a variable form, and the more northerly, *C. spinosa* Brod., may be nothing but a variety of this. Reeve has credited other species to the Galapagos, viz., *spinosa*, *Jamus*, and *imbricata*, the value of which it is not easy to determine; it is quite probable that too many species have been made. Also dredged off the coast of Lower California in 9½ fathoms.

Family CARDIIDÆ.

Genus CARDIUM Linné.

16. Cardium consors Brod.

One left valve, beach.
James Island.

Family VENERIDÆ.

Genus CHIONE Megerle.

17. Chione multicostata Sby.

Valves, beach.
James Island.

18. Chione compta Brod.

Three left valves, beach.
Indefatigable Island.

19. Chione undatella Sby.

Valves, beach.
James Island.
Two right and four left valves of what may be regarded as this species; the group to which it belongs is exceedingly numerous in individuals, and many species have apparently been made on simple varietal differences. Neither Carpenter's nor Wimmer's list credit any species of *Chione* to the Galapagos islands. The *Albatross* shells agree more nearly with the northerly *undatella* than with the geographically related forms from the mainland of South America.

Subfamily TAPESINÆ.

Genus **TAPES** Megerle.

20. Tapes grata Say.

Five valves; beach (Mus. No. 102457).

Indefatigable Island.

This species, which includes in its synonomy *Venus discors* Sby., extends from Lower California, southerly to the Gulf of California, Central America and Panama to Ecuador; it runs pretty close to the west South American *T. antiqua* King, in certain features.

Family TELLINIDÆ.

Genus **Lutricola** Blainville.

21. Lutricola excavata Sby.

? *Lutricola alta* Conr.

One right valve, dead; beach.

Indefatigable Island.

Dr. Jones collected this (one valve) at Chatham Island, also at Payta, on the main land.

Class GASTROPODA.

Family BULLIDÆ.

Genus **BULLA** Linne.

22. Bulla punctulata A. Ad.

Abundant on the beaches.

Hood and indefatigable islands.

Dr. Jones found it common at Chatham Island as well as at various places on the main land of South America. *B. aspersa* A. Ad. is probably a synonym; it is very close to *B. adamsi* Menke of the Gulf of California.

Family BULIMULIDÆ.

Genus **BULIMULUS** Leach.

Subgenus **NÆSIOTUS** Albers.

23. Bulimulus nux, Brod., 1832.

The typical form was described by Broderip in the Pro. Zoöl. Soc. London, p. 125, and figured by Sowerby in his Conchological Illustrations 37 and 37*; the examples before me are from the same island as Broderip's type. Reeve's figure in the Conch. Iconica, 150, is misleading in this, that while it faithfully represents a not uncommon facies, it is not

a facsimile of the type as figured by Sowerby, and again it has more the appearance of a *Partula* than the characteristic aspect of *nux*.

Specimens closely agreeing with Reeve's figure* are in the National collection (Mus. No. 104822); they were presented by the late Dr. Lea, who received them, as well as other Galapagos species, directly from Mr. Cuming, and were no doubt a part of the original lot, collected at these islands by Cuming himself.

B. nux is an exceedingly variable form, and exhibits so many aspects of variation, that the most conservative conchologist might easily be led into species-making, even with an abundance of individuals before him, for this is one of those protean forms, like, for instance, *Patula strigosa–Cooperi–Haydeni–Hemphillii–Idahoensis*, etc., belonging to the Central province of the United States,† that can not be properly exemplified or understood by a few examples, nor even by a hundred specimens. In *B. nux*, some individuals are ventricose, others rather slender; in some the columella is straight or subarcuate, in others more or less twisted, or more properly distorted. Often the callus on the body whorl is heavy or thick, and connecting, forming a peristome; occasional individuals exhibit a tuberculoid thickening of the parietal callus on its edge. In some instances the shells are thin and almost translucent, others again, and more frequently, are opaque and solid. The sculpture varies from simple longitudinal incremental striæ more or less conspicuous, that is to say, fine or coarse, to examples with transversely or spirally incised grooving. Where these two aspects of sculpture are present in the same individual, a more or less distinct rectangular roughening is the result. Frequently the prevailing color is whitish or dingy white, in others dull purplish brown; many intermediate shades of these colors occur, and banded examples are not uncommon; in these the bands are sometimes conspicuous and striking and point towards a possible if not probable greater color-divergence, combined with slenderness of form, suggesting Forbes' *achatinellinus*.

Taking into consideration the different expressions of variation, *i. e.*, form, sculpture, color, and general proportions, *nux*‡ exhibits the greatest versatility; the extent of variability illustrated in the numerous examples, about two hundred before me, warrants the assumption that ten times the number would furnish many other facies, if not extremes of variation. I have above called attention to the discrepancies, between the figures of Sowerby and Reeve. In all cases where the various Galapagos species described by Broderip and Sowerby are referred to, the latter's figures must be regarded as authoritative, and be recognized as the standard type. Reeve's figures are frequently, if not usually, not a facsimile of the original,

* It is generally understood that Reeve's great work is in the main, based upon, and illustrates the Cuming collection.

† Binney's Manual Am. Land Shells, p. 163.

‡ *B. nux* occurs on three of the islands, viz, Charles, Chatham, and Albemarle.

but a figure of what in common parlance is called a "finer specimen" than the individual that was first described. It will at once be perceived that this practice must often lead to confusion. There are also discrepancies between the text and the numbering of the figures of the Galapagos Bulimi.

Reeve's figure "121 *eschariferus*" represents *rugulosus*, and his "135 *Jacobi*" probably applies to a bandless variety of *unifasciatus*.

To resume the consideration of the specific and varietal sequence and relationship of *nux*, as referred to and figured by authors, in comparison with the material before me, we have first—

Bulimulus nux Brod., Sby. Conch. Ill., figs. 37 and 37ª.

*

Typical, numerous examples (Mus. No. 118568). Charles Island.

Color purplish-black or dark reddish-purple; apex dark; the following one or two whorls light colored, or whitish; figure 37 shows inconspicuous dark bands on the body whorl. In a large number of specimens it will be seen that these run gradually into ashen gray, and again into pale ashen-blue.

* *

B. nux, banded variety—**B. ustulatus** Reeve non Sby.

Four examples (Mus. No. 118569).

Vide Reeve's Monog. Bulimus, Conch. Icon., fig. 130, not Sowerby's Conch. Ills., fig. 42. Reibisch's figure 5, of "*ustulatus* Sby.," represents banded example of *nux;* it is intermediate in form between the above specimens (No. 118569), and the slenderer form to which Sowerby gave the name.

* * *

B. nux, variety with intercised sculpture.

Charles Island; numerous (Mus. No. 118570).

Purplish-brown to rufous-white; surface sculptured by revolving incised lines. Mr. W. G. Binney's "*Arionta intercisa*, a species of the California region, from San Clemente Island and Santa Cruz Island," in the Santa Barbara channel and Dr. Newcomb's "*A. Ayresiana*," another island species from the same region occurring on Santa Cruz, San Miguel and Santa Rosa islands, are pertinent illustrations of the sculpture exhibited by the above variety of *nux*.

I have before called attention to the relationship of the character of sculpture above mentioned to the environment. It will be observed that it is present in a greater or less degree in forms that inhabit saline, arid, sandy and wind-swept stations. The *Bulimi* of the Gulf of California region, of the *pallidior*, *vegetus*, *Xantusi* group, exhibit it frequently; I have in mind *B. pallidior* from Carmen Island in the

Gulf, where the saline, sterile, and sandy elements prevail. Occasional examples of several species of the mainland forms of *Arionta* also furnish illustrations. In the sculpture of the South American *Bulimi* we find this character modified and carried to extreme elaboration until the shagreened surface is attained as in the Peruvian *B. proteus* and *B. mutabilis* (from Santos "under stones"). It will readily be seen that a form whose area of distribution includes subareas, where the environmental factors are varied to the extent of opposite or nearly opposite, as well as intermediate conditions, would exhibit extreme as well as a multitude of intermediate and what may be regarded as connecting facies or characters.

* * * *

B. nux Brod., Sby., ventricose variety = Reeve's type.

Several examples, Charles Island (Nos. 104822, 104963, and 122856). This is the Reeve type of *nux*, a more ventricose, much larger, and freer growing form than the typical and original *nux* of Broderip. The color, etc., quoting Reeve, is "olive-brown stained with rusty red; the aperture is frequently compressed at the sides so as to give a square aspect." Some examples hint, in the matter of color, at dark *café-au-lait*. The color is sometimes a dark reddish-brown; of No. 104822 there are three specimens; No. 104963, two; these are rather globose, and coarsely sculptured; of 122856, there are five examples, all in good condition.

It is apparently an intercised aspect of this ventricose variety (*i. e.*, Reeve's type of *nux*) that has received the names of *asperatus* from Albers, and *incrassatus* from Pfeiffer (Mus. No. 23277). Reibisch gives a figure of Pfeiffer's species in plate 1, 4*a*, and adds a varietal name to the same of *sulcatus*, figs. 4*b* and 4*c*; while his figure 4*d* is given as *incrassatus* variety = *nuciformis* Petit, which is probably correct. Reibisch's figure 3, pl. 1, of *asperatus* Albers, indicates the propriety of its connection with the above.

* * * * *

B. nux, elongated variety.

Charles Island; several examples (Mus. Nos. 118573, 122855, and 23277).

This is an elongated form of *nux*, sometimes strongly longitudinally ribbed, and probably includes *verrucosus* Pfr., as a variety. Nos. 118573, two examples, point toward B. *rugulosus*. Some forty or fifty examples in addition to the foregoing numbers, are in the National collection.

* * * * * *

B. nux, variety with distorted mouth.

Charles Island; several (Mus. No. 118571). Parietal callus produced, forming a continuous peristome. Columella distorted or twisted.

The peculiar development of callus, and distorted aperture caused thereby, are probably due to the deposition of shelly matter, limey mucus or lymph, at the time of hibernation, when the animal has attached itself to the twig or stalk of the plant which is to be its resting place for its season of inactivity. The stalk or twig, being round or roundish, and the mouth of the shell or aperture not fitting closely to the inequalities of the surface, in order to exclude the air, a deposit is made, and a filling in of the chinks or closing of the gaps ensues, and perfect adhesion is secured as well as complete exclusion of the atmosphere. Where, in other instances, the peculiarity referred to is less conspicuous, the adhesion during hibernation has been to some object of a different shape, as perhaps, to the surface of a stalk of larger proportions, where the exact spot of adhesion was more nearly in plane with the aperture; in such a case the gap or discrepancy between the edge of the aperture and the surface adhered to, would require but a slight deposit in order to close it or, in other words, the character of the surface of the object to which the individual adheres at the time of hibernation, practically molds and shapes the peristome or edge of the aperture, the callus conforming to the inequalities of the surface.

* * * * * * *

B. nux, variety with crenulated suture.

Charles Island; one example (Mus. No. 122002).

The crenulation of the suture, attributable to the butting up of the incremental lines against the base of the preceding whorl, during the process of growth, a not uncommon character, and an exceedingly conspicuous feature in many of the South American Bulimi of the west coast.

* * * * * * * *

B. nux, variety with sutural nodes.

Chatham Island; one example (Mus. No. 122003).

This form properly follows the preceding; it has a slightly crenulated suture in the specimen before me; and, as well as others that I have seen, is dark colored and has a sutural girdle of more or less conspicuous equidistant nodes. These sculptural characters occur doubtless quite independent of coloration. *B. nuciformis* Petit, is referable to this variety.

* * * * * * * * *

B. nux, varieties intermediate.

I also include in the general synonymy of *nux*, *nucula* Pfr., *invalidus* Reib., and *venustus* Reib; the latter is apparently a dwarfed form. These species of Reibisch's are numbered in pl. 1, figs. 6 and 7. His *Wolfi* is from Indefatigable Island, upon which *B. nux* has not yet

been detected, else I should regard that also as an aspect of *nux*, belonging to the variety represented in the National collection by No. 118571. Of the protean *nux*, it will be noticed upon the examination of Reibisch's list that he had only a few imperfect examples. Of what value to the student is such limited material?

24. Bulimulus Jacobi Sby.

Chatham Island; several examples; (Mus. No. 122005). Sowerby figures (Conch. Ill. 45,) both banded and bandless specimens. The above number includes shells that are obscurely banded (No. 122117 of the Museum series), and others that are distinctly banded. See previous comments (under No. 23) on Reeve's figure of *Jacobi*.

25. Bulimulus rugulosus Sby., not rugulosus Rve.

Charles Island; abundant (Mus. Nos. 122000, 122001).

This form is apparently nearly as numerous as *nux*. Reibisch refers it to Chatham and does not credit it to Charles Island. On the former he says "it is common on bushes, on the cliffs and under stones, at an elevation of from 300 to 600 feet; this is the prevailing form on Chatham, the same as *nux* is on Charles."

Ancey* has named two varieties of *rugulosus*, namely *infuscata* and *planospira*, both from Chatham Island examples.

In one example (No. 122001) we have an approach to *sculpturatus* Pfr.

26. Bulimulus eschariferus Sby., non Reeve.

Chatham Island, several examples (Mus. No. 122006).

It was on this island that Darwin collected his specimens; the Petrel-Cookson examples were detected on Charles Island. Of these, Mr. E. A. Smith says: "The Charles Island shells are considerably larger than those from the above locality [Chatham Island], and also coarser in sculpture, some of them displaying spiral granose or rugose striation, as in *B. rugulosus* Sby., from the same islands, and, indeed, they appear to be an intermediate variety or connecting link between the two species, both as regards size and sculpture."

Ancey† has named two varietal aspects of the foregoing, *bizonalis* and *subconoidalis*.

27. Bulimulus (Pleuropyrgus) chemnitzioides Forbes.

Chatham Island (Mus. No. 122004).

Several examples of this interesting form, upon which Von Martens‡ based his genus *Pleuropyrgus*, were detected at Chatham Island. It was here that Forbes's type was obtained; it is the only species in

*Bull. Soc. Malac. France. Juillet, 1887, pp. 293-299.

†Id.

‡Albers die Heliceen, 2d ed., Leipzig, 1860, p. 221.

Von Martens' genus thus far described. The National collection contains, in addition to the above, two examples (Nos. 122014 and 102549), collected by Dr. Habel several years ago, presumably at this island, though not definitely stated. Reibisch reports it from Chatham only, in the Wolf collection; three examples, abundant on rocks and under stones, with *Bul. rugulosus* at an elevation of from 300 to 600 feet. This species is "27" of the Reibisch Wolf list. His "28" *B. (Pleuropyrgus) lima*, described from two examples, one of these possibly a junior, is probably identical with *chemnitzioides*.

28. Bulimulus (Pleuropyrgus) Habeli Stearns.

Plate LI, figure 1.

Nautilus, January, 1892, Dall.* Also described by the author in the Nautilus, December, 1892.

= *B. (Pleuropyrgus) terebra* Reibisch.†

Chatham Island (Mus. No. 122119).

Two specimens were collected at this island April 4, 1888. The National collection contains two other examples (No. 122015), detected by Dr. Simeon Habel, at some one of the islands, several years ago, presumably at Chatham, which is the only island of the group where the *Pyrgus* type of bulimoids has been found. The *Albatross* shells are in perfect condition, the Habel specimens somewhat rubbed. One of the latter is of a pale, dull, reddish tint throughout the greater part of the shell, lighter on the upper part of the whorls following the suture, with a narrow whitish band on the basal whorl, and the columella white or whitish. The other of the Habel examples is white throughout; the lower three or four whorls preceding the basal, are rather faintly banded with pale ferruginous red, which alternate with whitish bands above and below on the basal whorl. The Habel specimens being somewhat rubbed, the ribbing is less conspicuous than in the *Albatross* examples, and the whitish surface glazing of the *Albatross* specimens obscures to a considerable degree the color beneath, as seen in Dr. Habel's shells. A fuller description than that given by Mr. Dall was published by me in The Nautilus, December, 1892, together with preliminary diagnoses of other species from the Galapagos and elsewhere. The portion relating to the above is here repeated: "Shell slender, elongated, thin, smooth, and shiny, slightly umbilicated, with thirteen to fourteen gradually increasing whorls; whorls slightly convex and longitudinally obtusely plicated; suture distinct; aperture ovate and slightly reflected at the base of the columella. Color ashen white, slightly rufous, with hints of a narrow reddish band beneath the surface glaze.

"Dimensions (of largest example): Long. 17.5, diameter, 3.5 millimeters.

* "On some types new to the fauna of the Galapagos Islands," by W. H. Dall.

† Die Conchologische Fauna der Galapagos-Inseln, von Paul Reibisch, Ges. Isis in Dresden, 1892. Abh. 3, 20 pp., 2 plates.

"This form is much more slender than *P. chemnitzioides* Fbs., which is well represented by the figs. 6*a*, 6*b*, Pl. IX, Proc. Zoöl. Soc. London, 1850. Aside from the differences in color and sculpture, the surface of Forbes's species is dull in fresh, unrubbed, perfect specimens; the ribs in the latter species are comparatively sharp, threadlike, regular, and somewhat distant, the interspaces being perceptibly wider than the ribs are thick."

Again borrowing from Reibisch, it is seen that the foregoing occurs at an elevation of from 900 to 2,000 feet in the wooded region, on mossy rocks and under stones, and he quotes Wolf's notes, and says that it is abundant, though it appears that Reibisch had only four examples, of which hardly one was well preserved.

The various species made by Reibisch are based, it would seem, upon a very uncertain foundation, the number of individuals, in most cases being altogether too limited, the extraordinary variability of the Galapagos land shells being considered, and the few examples upon which in nearly every instance his diagnoses rest, were generally in poor condition.

Family SUCCINIDÆ.

Genus **SUCCINEA** Draparnaud.

29. Succinea Bettii Smith, var. = **S. Wolfi** Reib., var.

Chatham Island, one example (Mus. No. 122133).

This shell is a narrow, delicate variety of the species described by Mr. Smith, whose specimens were from Charles Island (Petrel-Cookson collection). This solitary *Albatross* example agrees with Reibisch's Fig. 12*b* in Pl. II of his paper.

Family ONCHIDIIDÆ.

Genus **ONCHIDIUM** Cuvier.

30. Onchidium Lesliei Stearns.

Preliminary description in "The Nautilus," December, 1892.

Plate LI, figures 2, 3.

Between tide marks, living.

Charles Island, April 8, one example (Mus. No. 122519); Albemarle Island, April 10, 1888, two specimens (Mus. No. 122520).

Form rounded ovate, nearly as broad as long. Dorsum coriaceous, nearly black, shiny, closely irregularly reticulated with finely incised lineation, and otherwise characterized by somewhat distant, rather flatly rounded papillæ. Under side dingy, yellowish white; margin of mantle wide, nearly smooth; edge of same simple. Anal opening posterior near edge of mantle and somewhat produced. Respiratory orifice smaller, in median line with and in front of anus. Sexual orifice anterior, on the right side under the edge of the large oral hood or collar. Labial palpi thin, largely expanded. Dimensions: Length, 37.5;

breadth, 31.5 millimeters. These proportions vary slightly in different individuals.

Genus **ONCHIDELLA** Gray.

31. Onchidella Steindachneri Semper.

Plate LI, figures 4, 5.

Living examples, between tide marks.

Charles Island, April 8, six specimens (Mus. No. 122518); Albemarle Island, April 10, 1888, one example (Mus. No. 122517).

A well-marked species; edge of mantle prettily fringed on the under side with rather regularly placed trifoliate processes. Dorsum entirely covered with closely set, rounded, granular papillæ, which also cover the surface of the wide mantle margin beneath, up to the edge of the creeping disk. Color dark grayish or smoky black above; dingy whitish on the under side. Anal orifice posterior, central just behind the end of the creeping disk? Respiratory orifice on the right side near the vent. Sexual orifice anterior near the tentacle or oral appendage, under the edge, on the right side. Length about 20, breadth about 17 millimeters. These proportions vary somewhat in different specimens. Some allowance must be made for the contraction caused by the alcohol in both the above and *O. Leslici*.

Family SIPHONARIIDÆ.

Genus **SIPHONARIA** Sby.

Subgenus **WILLIAMIA** Monterosato.

32. Siphonaria (Williamia) peltoides Dall.

Beach shells.

Hood Island, two examples in fair condition (Mus. No. 102365); previously detected in the Galapagos by Dr. Habel (Mus. No. 60416), at which of the islands not stated. Dall* gives the range of its distribution northerly as Monterey; it has since been detected near Crescent City, Cal., which adds about 370 miles to its northerly range.

Family CONIDÆ.

Genus **CONUS** Linné.

33. Conus brunneus (Gray) Wood.

+ *C. diadema* Sby.
+ *C. tiaratus* Brod.

Numerous; beach shells.

Hood, Indefatigable, and James islands each furnished many examples of the typical form of *brunneus*.

An exceedingly variable species in size, color, and sculpture.

The uniformly brown-colored specimens = *C. diadema* Sby. The sharply sculptured and generally dark-colored individuals (Sow.,

*Am. Jour. Conch., Vol. VI, 1870.

Conch., Ill., fig. 10) are the *tiaratus* Brod. described by the author from Galapagos examples. Pale-colored specimens with a facies intermediate with these have been credited to the Indo-Pacific species *miliaris*, or rather this last has been credited to the Galapagos Islands through the general and often quite close resemblance of individuals from these widely separated regions. The variety of *brunneus* resembling *miliaris* was obtained at both Hood and Duncan islands. Another Indo-Pacific cone, *C. minimus* auct., has been wrongly referred to these islands, the exceeding variableness of *C. brunneus* and the erroneous determinations of authors having brought about this confusion. Thus Reeve says, in his Monograph of the cones, "there can be no doubt of Mr. Broderip's *C. tiaratus* being a variety of *minimus;* they exhibit too many characters in common to allow of their being separated." Cuming collected the Broderip form at the "Galapagos Islands, found in pools on the sands." Subsequently at the end of his Monograph, Reeve changed his mind and admitted Broderip's *tiaratus* as valid, but failed to observe its relationship to *brunneus.* Tryon also fell into the error of including *tiaratus* in the synonymy of *miliaris*, and in this way crediting the latter to the Galapagos Islands. Reeve also (Monograph of the Cones, Pl. XLI) adds to the confusion by fig. 224, "*C. varius* B., Galapagos Cuming," which figure simply presents a variety of *brunneus* and corresponds to two examples collected by Dr. Jones at Manta, Ecuador. Cuming found this shell in clefts of the rocks at low water. It has been monographed with *varius*, an Indo-Pacific species, as "*pulchellus* Sby., non-Swainson, and *interruptus* Wood."

A common aspect of *C. brunneus* is of a uniform sienna-yellow with a faint median band and purplish at the base of the columella. The sculpture, as before intimated, varies considerably in sharpness, and this applies as well to the granules on the main whorl as to the coronation of the spire.

The importance and advantage of a large series of a species such as that of *C. brunneus* in the national collection are obvious when questions of identity and distribution are involved, as in the foregoing instance.

The synonymy also through error includes, as my remarks show, *miliaris*, *minimus*, and *varius* B., all Indo-Pacific forms. While many forms of a decided Indo-Pacific character do occur on the west coast of North America, I have as yet failed to detect a single Galapagos species that does not exhibit as close or closer relationship to characteristic West American mainland forms.

34. Conus lucidus Mawe.

=*C. reticulatus* Sby.

Not common; beach.

Hood and James islands.

Dr. Jones collected one example at Chatham Island.

35. Conus pyriformis Rve.

A single example (Mus. No. 102342).
Hood Island.

36. Conus nux Brod.

Beach shells.
Hood (102345) and James islands (102271).

Exceedingly close to the Indo-Pacific species *Ceylonensis* Hwass., which latter includes according to Tryon the synonyms *pusillus* Gould, *acutus* Sow., *pusillus* (Chemn.) auct., *tenuisulcatus* Sow., *sponsalis* Chemn., *nanus* Brod., to all of which, excepting Gould's, Tryon gives a varietal position. Tryon includes the west coast shell in the synonymy of *Ceylonensis*, but whatever may be the opinion of others on this point Broderip's name may conveniently be retained for the West American shell. Found at Chatham Island by Dr. Jones.

37. Conus gladiator Brod.

One example, beach. (102273.)
James Island.

Mr. Tryon comments on the closeness of this form to *brunneus*. I have at various times possessed and handled a large number of specimens, but have never been impressed by any such resemblance.

38. Conus Fergusoni. Sow.

Several specimens, beach.
James Island (No. 102270); Indefatigable Island No. 102450).

This rare species seems to have its home in the Galapagos islands. The original example, $5\frac{3}{4}$ inches in length, was said to have been collected at Panama. Some seven or eight specimens were obtained by the *Albatross*, four of them at Indefatigable Island. The largest of these was $4\frac{5}{8}$ and the smallest $2\frac{3}{4}$ inches long. One of them was quite fresh, with epidermis intact. Notwithstanding its large size, it is quite unattractive, being a coarse white species without the slightest ornamentation.

The Galapagos islands, or rather certain of them, appear to be the specific center of a few marine forms, and a few other species here attain, in the matter of size and solidity, a remarkable development. Among the Cones *C. Fergusoni*, exceedingly rare on the mainland and so seldom met with in collections, is not infrequent on James and Indefatigable islands; so with *Conus purpurascens* and the variety of the same known as *C. regalitatus*, which are found at several of the islands. The interesting and variable *C. brunneus*, with its characteristic yet extreme varieties, has its metropolis in the Galapagos group. So also with *Murex (Phyllonotus) princeps*, *Purpura melo*, *P. planospira*, *P. patula* and its close relative *P. columellaris*. *Cassis tenuis* here attains a vigorous growth and frequently an extraordinary size and solidity; *Cypræa nigropunctata* is common, elsewhere exceedingly rare, and so with many other less conspicuous forms.

39. Conus purpurascens Brod.

+ *C. regalitatus* Sow.

Common; principally worn beach shells.

Hood, James, Indefatigable, and Charles islands.

Tryon, following previous writers, assigns to *regalitatus* a varietal position, but examples that are intermediate in coloration are exceedingly numerous. Hence no doubt the following synonymy which includes *C. neglectus* A. Ad., based upon a young example; *C. luzonicus* Sow, non Hwass., and *C. comptus* Gould; and perhaps *C. achatinus* Mke., non. Chemn, as the variety *regalitatus*. From James and Hood islands the examples are numerous and principally of the typical *purpurascens* coloration, etc. (Nos. 102276 and 192240); specimens of the *regalitatus* var. (No. 102277) were obtained at James Island. One of each from Indefatigable (Nos. 102460 and 102461); and one beach shell of the varietal form, from Charles Island (102312). Tryon gives the distribution as extending from Panama to Mazatlan, but my paper on Dr. Jones' shells carries the species as far south as Payta in Peru, and unpublished notes on a large collection made several years ago by Mr. W. J. Fisher adds considerably to its northerly range in the Gulf of California region, namely, at San Josef Island, Port Escondido, Los Animas Bay, Angeles Bay, as well as the group of islands known as Tres Marias.

Family PLEUROTOMIDÆ.

Genus **MANGILIA** Risso.

Subgenus **CYTHARA** Schumacher.

40. Cythara densistriata Cpr.

Two examples (No. 122125).

Chatham Island.

Subgenus **DAPHNELLA** Hinds.

41. Daphnella sp.

A single beach-worn example from Indefatigable Island, too much rubbed to admit of determination. Hinds described *D. casta* from the west coast of America; it may belong to that species.

Family OLIVIDÆ.

Genus **OLIVELLA** Swainson.

42. Olivella ? gracilis Gray.

One beach specimen (Mus. 122120).

Chatham Island.

The worn condition of this solitary example makes the foregoing determination somewhat doubtful.

The Olives, so common on the mainland and in the Gulf of Califor-

nia, seem to be of rare occurrence in the Galapagos Islands. Carpenter reports only one, *kalcontina*, in his Reeve list. Dr. Jones detected *O. peruviana*, one example, and the *Albatross* collectors were the first to collect an *Olivella*.

Family MARGINELLIDÆ.

Subgenus **PERSICULA** Schumacher.

43. Marginella (Persicula) imbricata Hinds.

One example beach; (Mus. No. 117969).

Indefatigable Island.

A single specimen, considerably rubbed, but agreeing in form with the perfect examples in the National collection.

44. Marginella (Persicula) phrygia Cpr.

One specimen, beach; (Mus. No. 117968).

Indefatigable Island.

The characteristic markings of this species are sufficiently distinct in the solitary specimen collected to make the above determination satisfactory. The National Museum has another example from the Galapagos (No. 56077), the particular island not specified, probably collected by Dr. Habel.

Family MITRIDÆ.

Genus **MITRA** Lamarck.

45. Mitra effusa Swains.

One fresh, perfect specimen (Mus. No. 102391).

James Island.

The distribution heretofore given as "Guacomayo, Central America, Galapagos Islands," must be extended northerly to the Gulf of California. Fisher collected it in Mulege Bay, and several years ago the late Dr. W. M. Gabb detected it somewhere along the Gulf coast of Lower California.

Genus **STRIGATELLA** Swainson.

46. Strigatella tristis Brod.

Beach shells not uncommon.

Hood, Duncan, and James islands.

Several examples from Hood (No. 102381), one shell from James Island, and a fresh specimen from Duncan Island (Mus. No. 102315). The occurrence of this species in the Galapagos group is corroborated by Dr. Habel's specimens (Mus. Nos. 56133, 56337), as well as by other collectors. Tryon, following Carpenter, gives the northerly distribution as Mazatlan, but it is found at other and more northerly localities

in the Gulf of California, etc., where Fisher collected it in Mulege and also in Los Animas bays on the easterly shore of Lower California respectively, about 200 to 325 miles farther to the north.

Family FASCIOLARIIDÆ.

Genus **FASCIOLARIA** Lamarck.

47. Fasciolaria princeps Sow.

Broken shell and fragments.

James and Indefatigable islands.

Cuming collected this species on the coast of Peru, the most southerly point reported; not before detected at the Galapagos Islands.

Genus **LATIRUS** Montfort.

48. Latirus varicosus Rve.

Beach specimen.

James Island.

49. Latirus tuberculatus Sby.

Common on the beaches.

Hood Island (1); James Island (3); Indefatigable (3); Duncan Island, numerous fresh examples (Mus. No. 102314).

Family BUCCINIDÆ.

Genus **PISANIA** Bivona.

Subgenus **TRITONIDEA** Swainson.

50. Tritonidea sanguinolenta Duclos.

= *T. hæmastoma* Gray.

Beach shells, in various conditions.

Hood Island, not uncommon (Mus. No. 102379); James Island, frequent, two fresh specimens; Duncan Island, one beach shell; Charles and Indefatigable islands, beach shells and fragments. The inclusion of *Janelii*, Val.,* in the synonomy of *hæmastoma* by Carpenter and others is an error, as *Janelii* is a markedly different form.

Genus **ENGINA** Gray.

51. Engina carbonaria Reeve.

Beach shells, in various conditions.

Hood Islands, numerous (Mus. No. 102363); James and Duncan islands (Mus. No. 102319), one each.

52. Engina carbonaria Reeve., var. = crocostoma Reeve. + forticostata Reeve.

Beach shells.

Hood Island (Mus. No. 102364). Tryon included *crocostoma* and *forticostata*, both of Reeve, in the synonomy of *carbonaria*, and I am in-

* *Buccinum Janelii* Val., Voy. Venus, Moll., 1846.

clined to think he was right. *E. crocostoma*, as I see it, is a yellow-mouthed variety of *carbonaria*. The typical *carbonaria* has a bluish-white mouth.

Family NASSIDÆ.

Genus **NASSA** Lamarck.

53. Nassa nodicincta A. Adams.

Beach shells.

Indefatigable Island (Mus. No. 122113); Chatham Island (No. 122111; one at each place. This is rather a rare form. Previously reported from the Galapagos by Cuming. Not figured in Tryon's Monograph or elsewhere, so far as I have been able to learn.

Family COLUMBELLIDÆ.

Genus **COLUMBELLA** Lamarck.

54. Columbella castanea Sow.

Beach shells, in good condition.

Hood Island, four specimens (Mus. No. 102374).

55. Columbella Paytensis Lesson.

= *C. sparca* Sow.

Beach specimens.

Hood Island (Mus. No. 102373); Indefatigable Island (Mus. No. 102468). The example from Hood is hardly characteristic, yet it is nearer *paytensis* than to *castanea*. Abundant at Payta (Jones's collection).

56. Columbella hæmastoma Sby.

Not uncommon, beaches.

James Island, five. Hood, common. Indefatigable, two specimens, one fresh (Mus. Nos. 102460, 102372). Occurs also on the coast of Ecuador and in the Gulf of California.

57. Columbella fuscata Sby.

Beach shells; many fresh and in good condition.

Indefatigable and Hood islands, common (Mus. Nos. 102467, 102371); Chatham, one example (No. 122118); and James Island, two fresh specimens. Dr. Jones collected this species at Payta, Peru, and at Manta, Ecuador. Common in the Gulf of California.

Subgenus **NITIDELLA** Swainson.

58. Nitidella incerta Stearns.

Plate 11, figure 6.

(Preliminary description in "The Nautilus," December, 1892.)

One example, beach, dead; one perfect.

Indefatigable Island (Mus. No. 122012). Also (island not stated) Habel collection (Mus. No. 122013).

Shell small, rather solid, acutely ovate, spire elevated, pointed, whorls six to seven, moderately convex, with inconspicuous revolving grooves, more distinct on the lower part of the body whorl; upper whorls delicately sculptured with close-set, rounded, longitudinal ribs. Apex obtuse. Aperture nearly half the length of the shell. Outer lip somewhat thickened, with five to seven denticles on the inner side. Columella, with a single rather prominent plait or tubercle, just below the middle. Surface colored by five to six brownish red bands, alternating with as many white ones, on the body whorl.

Dimensions: Length, 6.02; length of aperture, 3; breadth, 2.75 millimeters.

The above description is based on a single fresh perfect specimen in the Habel lot (122013); the others are so much rubbed as to be of little diagnostic value. All show the tubercle on the columella. It is not unlikely that in a number of fresh specimens considerable color variation would be exhibited. The specimen described is beautifully and conspicuously banded or striped. The above is nearer to Carpenter's *Nitidella millepunctata* than to any other west coast form with which I am familiar. In comparison with the most perfect adult of the latter, from Cape St. Lucas (Mus. No. 4147), certain similarities and differences are perceptible. The interior crenulation of the outer lip, the longitudinal plication of the upper whorls, and the sculpture striation of the lower part of the basal whorl are nearly or quite alike in both. The differences are seen in the more elongated form of *millepunctata*, the greater convexity of the whorls, the more pronounced sutural definition, and the strong tubercle on the columella. The color marking of *millepunctata* is indicated by the specific name, and the general tone of the surface is yellowish.

This may possibly be "24 ? sp." of Wimmer's list from Bindloe Island, which he refers to *Amycla* and compares with *arara* Say. It is often not easy to determine to which of the groups of the *Columbellidæ* some of the forms should be assigned.

Family MURICIDÆ.

Subfamily MURICINÆ.

Genus **MUREX** Linné.

Subgenus **PHYLLONOTUS** Swainson.

59. Murex (Phyllonotus) princeps Brod.

Beach shells in various conditions.

James and Charles islands, common; also less numerous on Indefatigable Island. Frequently of large size and often quite solid and heavy.

Genus **TROPHON** Montfort.

60. Trophon ? xanthostoma Brod.

=T. *Peruvianus* Lesson.

One beach shell, junior, in good condition. Hood Island. (Mus. No. 102351).

Subfamily PURPURINÆ.

Genus **PURPURA** Bruguiere.

61. Purpura patula Linné.

Common on the beaches, etc.

James, Indefatigable, and Hood islands. Several fresh specimens from the first place (Mus. No. 102279), and numerous dead shells from the other islands. Also at Chatham Island, in Jones's collection.

Section **PURPURELLA** Dall.

62. Purpura (Purpurella) columellaris, Lamarck.

Common along the shores, etc.

Hood, James, Chatham, Charles, Duncan, and Indefatigable islands; quite large and heavy shells from the latter (Mus. Nos. 102376, 102311, 102318, 102282, and 122113). From Hood one solid specimen measured 3 inches, and the smallest adult only thirteen-sixteenths of an inch in length. The examples from James Island vary considerably in the elevation of the spire.

Section **PLANITHAIS** Bayle.

63. Purpura (Planithais) planospira Lam.

Beaches, abundant and frequently of large size.

Hood, Indefatigable, and James islands (Mus. No. 102377); quite numerous on the two last islands, where it often occurs with the surface burrowed by some form of *Pholad* or *Lithodomus*. This species appears to be rather insular in its distribution. It is abundant and fine at Socorro Island, one of the Revillagigedos group, which is situated in latitude 18° 35′ north, and longitude 111° west of Greenwich, distant from Mazatlan something over 300 miles, in a southwesterly direction, and about 240 miles south from Cape St. Lucas. The Galapagos examples are often exceedingly solid and heavy.

Section **THALESSA** H. & A. Ad.

64. Purpura (Thalessa) melo Duclos.

Beach shells, common.

James, Duncan, Hoods, and Indefatigable islands. Closely related to the Antillean *deltoidea*, and suggestive of a common ancestry. Dr. Jones collected the above at Chatham Island.

65. Purpura (Thalessa) callaoensis Gray.

= *Coralliophila callaoensis* Auct.

Fresh specimens, beach.

Charles Island, three examples (Mus. No. 102313). In Tryon's Manual the above is grouped with *Coralliophila*. Common at Manta, coast of Ecuador.

Genus **MONOCERAS** Lamarck.

(= **ACANTHINA** F. de Waldheim).

66. Monoceros grande Gray.

Beach specimens.

James and Indefatigable islands; apparently rare; the distribution of this species seems to be confined to the Galapagos group; the national collection contains a good example (No. 60719), probably collected by Dr. Habel; the particular island not stated.

Subfamily TÆNIOGLOSSA.

Family TRITONIIDÆ.

Genus **TRITONIUM** Cuvier.

Section **COLUBRARIA** Schumacher.

67. Tritonium (Colubraria) Sowerbyi Reeve.

The basal whorl, of what I regard as the above species, was obtained at Indefatigable Island (Mus. No. 117976). Reeve credits the above (6 fathoms sandy mud, Cuming), as well as a related form *T. reticulatus* to the Galapagos group. The fragment before me is in fair condition so far as color and sculpture go. While it evidently has general relations with *T. testaceus* Morch (=*distortus* and *obscurus*, Tryon pars.), it is much more finely sculptured and less rugged in its general facies than the latter; it also somewhat resembles *T. reticulatus* Blve., (=*intertextus* Rve.), but is a more solid shell than that species. Both *reticulatus* and *testaceus* are found in the Antillean-Caribbean region. As many marine species are common to the waters on both sides of Middle and South America, and many of the Tritons have an exceedingly wide geographical range, it would not be especially remarkable if either of the above were detected on the west side. Reeve has credited *recticulatus* to the Galapagos, but I am inclined to think that a small example of *Sowerbyi* is what that author had before him. The sculpture of the fragment agrees with the description which Reeve has given as characterizing *Sowerbyi*, and though the fragment is without the general color or markings of either *recticulatus* or *Sowerbyi*, in my judgment it should be assigned to the latter rather than described as new. In the Colubraria group of Tritons color is not a constant character, and many of the species, to my knowledge, are colorless or nearly destitute of color markings.

Section SIMPULUM Klein.

68. Tritonium (Simpulum) olearium Linné.

Beach, fragment.

Indefatigable Island. A part only of a specimen, but sufficiently large and in good enough condition, so that the determination was not difficult. Dr. Jones detected this species on the coast of South America, at Manta, in Ecuador; also at Payta, in Peru. The *Albatross* and Jones collections greatly extend the previously well-known wide distribution of this form. Its geographical range is seemingly world-wide within tropical and semitropical waters.

Family CASSIDIDÆ.

Genus CASSIS Lamarck.

Subgenus CYPRÆCASSIS Stutchbury.

69. Cassis (Cypræcassis) tenuis Gray. = *C. Masseræ* Kiener.

Common along the shores and the beaches.

James, Charles, Hood, and Indefatigable islands. The Galapagos group, if we may judge by number of individuals and the sturdy growth and size many of them exhibit, is the metropolis of this fine species. From Indefatigable the largest specimen measured 5¼ inches in length, with three to four conspicuous rows of nodules on the body whorl. An example somewhat larger from Hood Island, is about 5½ inches long, and nearly as heavy as an average individual of the Indo-Pacific *Cassis rufus* of same length. In Tryon's monograph of the *Cassididæ* this species is credited to the Galapagos only; it occurs however in the Gulf of California; the largest example from the Gulf region that I have seen is much smaller and less heavy than the maximum specimens from the Galapagos. A fine example from the Galapagos obtained by the late J. A. McNiel, measured nearly 6 inches in length.

Genus ONISCIDIA Swainson.

70. Oniscidia tuberculosa Rve.

Common on the beaches.

James, Hood, and Indefatigable islands. An abundant species at James Island where forty-six shells were obtained; less numerous at Indefatigable (Mus. Nos. 102163, 102370). Dr. Jones obtained it at Chatham Island.

Family CYPRÆIDÆ.

Genus CYPRÆA Linné.

71. Cypræa exanthema Linn., var. = C. cervinetta Kien

Beaches, not uncommon.

James and Indefatigable islands. This form has a wide distribution, from Payta, Peru, in the south to the Gulf of California and La Paz,

Lower California, in the north. The name *cervinetta* Kien, has quite generally been applied to the west coast shells, and it may be well for geographical reasons to so label them or as "*C. exanthema* var.= *C. cervinetta* Kien.," as above. They are one of the "pairs of analogues which inhabit both sides of the isthmus," of Darien, or Panama, as it is more commonly called. While the individuals of the two coasts are easily separable, there can be no doubt as to their ancestry. *C. cervus*, the habitat of which has been a matter of doubt, and therefore of discussion, is undoubtedly an east coast form, and may be regarded as a variety of *exanthema*. It is much more ventricose in proportion to its length, and as a rule, the spots are closer and more numerous than in *exanthema* proper. I have received first and last a great number of individuals of var. *cervinetta*, and have critically examined many more belonging to various persons, but have never met with the *cervus* form from the west side. The National Museum contains characteristic examples of *cervus* from Vera Cruz, collected by Dr. Strebel, in 1866.

Subgenus **LUPONIA** Gray.

72. Cypræa (Luponia) nigropunctata Gray.

Common on the beaches.

James, Hood, and Indefatigable islands (Mus. No. 102375). For the most part in poor condition. The Galapagos Islands are apparently the specific center or metropolis of this form. Dr. Jones solitary example from Manta, Ecuador, confirms the previous somewhat doubtful report of its occurrence on the coast of the mainland.

73. Cypræa (Luponia) albuginosa Mawe.

Beach shells.

James Island, one example. Previously credited to the Galapagos in Wimmer's list.

Genus **TRIVIA** Gray.

74. Trivia Pacifica Gray.

Beach shells.

Hood Island, four beach shells but fresh and in good condition (Mus. No. 102362).

Family CERITHIOPSIDÆ.

Genus **CERITHIOPSIS** F. & H.

75. Cerithiopsis neglecta C. B. Adams.

Beach shells.

Indefatigable Island, two examples (Mus. No. 122128).

Family CERITHIIDÆ.

Genus **CERITHIUM** Bruguiere.

76. Cerithium maculosum Kiener.

\+ *C. adustum* Kiener.
= *C. nebulosum* Sby.

Common on the beaches.

Duncan, James, and Indefatigable islands. Numerous specimens, some quite fresh and perfect were obtained; these include both; the smoother form is the *C. adustum* Sby. var., non Kiener, the latter author's figure and diagnosis not agreeing, else the wrong number is attached to the figure. At Chatham Island, Dr. Jones collected several examples.

Family MODULIDÆ.

Genus **MODULUS** Gray.

77. Modulus cerodes, A. Ad.

Beach shells.

Hood Island, two beach-worn specimens (Mus. No. 102354). Not heretofore reported from the Galapagos.

Family VERMETIDÆ.

Genus **VERMETUS** Morch.

Subgenus **SERPULORBIS** Sassi.

78. Serpulorbis squamigerus Cpr.

Beach shells, numerous.

Hood, James, and Indefatigable islands (Mus. No. 102341, 102350, 117966, 117967). From Hood Island, one example apparently varietal (No. 102350), rather flattened with pinched sides, resembling *V.* (*Aletes*) *centiquadrus* Val.

Subgenus **ALETES** Carpenter.

79. Aletes, species.

Beach, fragment.

Hood Island, too small and imperfect to warrant an attempt at determination.

Family LITTORINIDÆ.

Genus **TECTARIUS** Valenciennes.

80. Littorina (Tectarius) galapagiensis Stearns.

Plate LI, figure 7.

Preliminary description in "The Nautilus," December, 1892.

James Island; one example fresh and in good condition (Mus. No. 102509).

Shell small, rather solid, ovate conic, angulated in outline; five to

six and a half whorls; whorls covered with obtusely rounded and rather coarse nodules; of these the peripheral series is the strongest and the next preceding, somewhat less prominent, while the other girdles of nodes are still less conspicuous. The peripheral is closely followed by a parallel series just below, and the base is marked by succeeding rows of less prominence. The aperture is rounded-ovate and of a dark chocolate color; columella broad, somewhat excavated and produced below. Exterior dull chocolate-brown above, paler below, with still paler nodules.

Altitude, 7.50; latitude, 5 millimeters. Comparison with the Antillean and Indo-Pacific forms in the National collection indicates its non identity with any heretofore described.

Wimmer's list includes two species, namely (Hamus) *lemniscatus* Phil. and *trochoides* Gray, the first of the group reported as occurring here. The form herein described does not agree with either of the species catalogued by Wimmer; it is not so acutely conical as *trochoides* Gray, which Tryon includes in the synonymy of *nodulosus* Gmel., and the columella is broader and more produced at the base (posteriorly) than in *lemniscata* Phil., an Indo-Pacific form, regarded by Tryon as a synonym of *miliaris*. If Wimmer's determination is correct, which I am rather inclined to question, then three species of *Tectarius* are found in the Galapagos. Dr. Jones detected a single individual of this group at Manta, Ecuador, which I have listed with the Jones shells by the name of *Tectarius atyphus*, the first example of this genus from the West coast of the American continent. This is not referable to either of the species catalogued by Wimmer or to any others of the group, which is largely represented in the National collection.

Family RISSOIDÆ.

Genus **RISSO** Fréminville.

Subgenus **ALVANIA** Risso.

81. Alvania reticulata Cpr.

not *R. reticulata* Mont.,
= *R. Carpenteri* Weink., (Tryon).

Beach specimen in fair order.

Indefatigable Island, one example (Mus. No. 122127).

Described by Carpenter from Neeah Bay, Puget Sound specimens in the Ann. & Mag. Nat. Hist., Vol. XIV, 3d series, and agreeing with examples in the National Museum identified by Carpenter.

Wimmer records a species of *Alvania* without name; possibly either this or the following.

82. Alvania æquisculpta Cpr.

Beach example

Indefatigable Island (Mus. No. 122126). The single specimen collected by the *Albatross* was fortunately sufficiently perfect to admit of

identification. Named by Carpenter from Monterey, Cal., examples; collected by Mr. Harford and myself in 1867; now in the National Museum.

Genus **RISSOINA** Orbigny.

83. Rissoina fortis C. B. Adams.

Beach.

Hood Island, two shells (Mus. No. 102380). This species is in Wimmer's list.

Family CALYPTRÆIDÆ.

Genus **MITRULARIA** Schumacher.

84. Mitrularia cepacea Brod.

=*Calyptræa cepacea* Brod., Auct.

Beach, rare.

Indefatigable Island, one specimen (No. 102462); Chatham Island, three good specimens (Mus. No. 122116). Dr. Jones collected a specimen of this form at Manta, Ecuador (No. 48402). Tryon includes the above in his synonymy of *equestris*. Wimmer's list contains *Calyptræa varia* Brod., which may be the same as I regard as *cepacea* or the following. The Museum has an example of this rare form from Acapulco (No. 60248) and one from Panama (No. 3668).

85. Mitrularia corrugata Brod.

=*Calyptræa corrugata* Brod., Auct.

Beach shells.

James Island one imperfect example, but in sufficiently good condition to show clearly the characteristics of this rare species (Mus. No. 102511). This species appears to be another addition to the Galapagos list; it occurs at Acapulco, though quite rare nearly everywhere along the coast (Nos. 60247 and 59298).

Genus **CRUCIBULUM** Schumacher.

86. Crucibulum imbricatum Brod.

Beach specimen.

James Island; a single example in poor condition. Not before reported from the Galapagos. This form ranges from Lower California in the north to Payta, Peru, where several examples some 2½ inches in diameter were obtained by Dr. Jones. The small Galapagos collection made by Dr. Jones at Chatham Island includes *C. spinosum* Sby., which seems to have escaped detection by the *Albatross* collectors. This latter ranges much farther to the north than *imbricatum*, namely, to Monterey, Cal.

Mr. Tryon, in his monograph of the genus *Crucibulum*, makes the various imbricated forms that have been described, synonyms of *scutellatum* Gray; those that are "finely radiately costulate or smooth" he includes under the *varietal* name of *quiriquina* Lesson. Certain West Indian species he consolidates under the *varietal* name of *auriculatum* (Chemn.) Auct., an Indo-Pacific form is made var. *violaceum* Carpenter, and the West American spinose forms he places under the varietal name of *tubiferum* Lesson. His subordination of groups and species is as follows:

C. scutellatum Gray.
= *C. imbricatum* Brod.
= *C. corrugatum* Carp.
= *C. rugosum* Lesson.
= *C. dentatum* Menke.
= *C. costatum* Menke.
= *C. Cumingii* Carp.
= *C. extinctorium* Sowb.
= *C. rude* Brod.
= *C. gemmacea* Val.
= *C. pectinatum* Carp.
= *C. umbrella* Desh.
= *C. planata* Möreb.
= *C. concameratum* Reeve.
= *C. serratum* Brod.
The two latter presumably young shells.

Var. *quiriquina* Lesson.
= *C. trigonale* Ads. & Rve.
= *C. ferrugineum* Reeve.
= *C. lignaria* Brod.
= *C. tenue* Brod.
= *C. spectrum* Reeve.

Var. *auriculatum* (Chemn.), Auct., West Indian.
= *C. Cuvieri* Desh.
= *C. planatum* Schum.
= *C. Caribbeense* Carp.

Var. *violaceum* Carp. Ceylon.

Var. *tubiferum* Lesson.
= *C. spinosum* Sowb.
= *C. cinereum* Reeve.
= *C. hispida* Brod.
= *C. Peziza* Gray.
= *C. Peziza*, var. *compressoconicum* Carp.
= *C. maculatum* Brod.
= *C. striatum* Brod., not Say.
= *C. auritum* Reeve.

It will be noticed that the West Indian forms, the Ceylon species, as well as the rest, are made varieties of *scutellatum*. Any person who has collected or handled a large number of the West American shells of this group is well aware of the excessive number of specific names that have been attached to what may reasonably be regarded as varieties, and that many of such names rest upon a very frivolous foundation. While Mr. Tryon's condensation of these is measurably warranted, with the ample material of the National collection before me I can not follow or approve *in toto* of his very radical modification.

The first objection to the above is the reducing of the spinose forms to a varietal position and the second is the inclusion of others described under the names of *pectinatum*, *serratum*, *concameratum*, *striatum*, and *auritum* in either of Tryon's *varietal* groups. One species not included in Tryon's enumeration is referred in his index to *Galerus* or *Trochita*, that is, *C. sordida* Brod. (Rve., Mono., sp. 22); this belongs with the species *pectinatum*, etc., above named, making all together six. In these the internal process or cup is distinctly separable from all the others, and the large National Museum series shows that under any modification of form due to the shape of the object to which the shell

was attached, whether resulting in the pinching together or compression of the sides, etc., the cuplike process is unaffected so far as relates to the proportion of the same that is attached to the inner surface. Carpenter's *pectinatum*, to which in manuscript he gave also the name *Jewetti* (U. S. Mus., No. 56264), figured in Reeve's Monograph in pl. v, 11, 11*a*, exhibits the characters and extent or proportion of the cup that is fixed to the side.

A careful examination of one hundred and thirty-four examples included in thirty-two lots from thirteen localities between Lower California, in the north, and Payta, Peru, in the south, discovered no connecting links between the usual form of the cup, as seen in the species of the imbricated group, and the triangular cup of the *pectinatum*, *serratum*, *etc.*, forms I have named. Besides the above example of *pectinatum*, which was collected at Mazatlan, the Museum series contains two from the "Gulf of California" (No. 60239), which, on previous and hasty identification, were wrongly determined as "*imbricatum* var.," and a fourth from Panama; the exterior sculpture is also persistent and characteristic, easily separable from the others of the *imbricated* group. Of the one hundred and ninety-four examples of the *spinose* form from nineteen localities between San Pedro, California, in the north, to Payta, Peru, in the south, and the Galapagos, in the National Museum, not one example occurs, whatever may be its shape, compressed or pinched, conical or flattened, wherein the internal cup is attached as in *pectinatum*, etc.; neither have I observed in the course of going over the two groups *imbricatum* and *spinosum* any difficulty in separating them or any reason for uniting them by reason of the occurrence of varietal forms wherein the characters are too indefinite for satisfactory determination.

The foregoing is printed as written nearly two years ago. Recently, in relation to the Tertiary fossils of Florida,* Dr. Dall has referred to this character of the attachment of the cup, and he assigns certain forms, wherein the cup is adherent, to *Dispotæa* (Say) Conrad.

Dispotæa as a section or subgenus of *Crucibulum* will therefore include *pectinatum* + *Jewetti*, *serratum*, *concameratum*, *striatum*, *auritum*, and *sordidum*.

In this portion of his paper Dr. Dall remarks, "the species of both groups [*Crucibulum s. s.; and Dispotæa*] have been very greatly overstated by naturalists who have assumed the constancy of the surface characters or those due to station." Farther on he says, "the Pacific *imbricatum*, except for the link furnished by the fossils, is quite distinct from its near relative, *C. spinosum*, but in the Pliocene fossils the intermediate forms are more numerous, and there the two can hardly be regarded as distinct species."

* Transactions Wagner Institute, Phila., Vol. III, part II, Dec. 1892.

Genus **CREPIDULA** Lamarck.

87. Crepidula aculeata Gmel.

Beach shells, rare.

Indefatigable and Hood islands (Mus. No. 102361). Dr. Jones found this form abundant on the mainland at Payta, Peru.

Family AMALTHEIDÆ.

Genus **AMALTHEA** Schumacher.

88. Amalthea Grayanus Mke.

= *Hipponyx Grayanus* Mke.

Beach shells, common.

Hood, Chatham, and Indefatigable islands. Several specimens in fair condition (Mus. Nos. 102358, 122108, 102464).

89. Amalthea antiquatus Linné

= *Hipponyx antiquatus* Linné.

Beach, several examples.

Indefatigable Island (Mus. No. 102465). Six rather small specimens from Chatham Island in Dr. Jones's collection. Wimmer's list also includes it.

90. Amalthea barbatus Sby.

= *Hipponyx barbatus* Sby.

Common on the beaches.

Chatham, James, Indefatigable, and Hood islands (Mus. Nos. 122109, 102466, 102357). Good, fresh examples were obtained at all of these islands. Dr. Jones's collection includes it from Chatham Island.

Family NATICIDÆ.

Genus **POLYNICES** Montfort.

91. Polynices dubia Recluz.

= *N. Atacamensis* Phil.

Beach, one example.

Indefatigable Island (Mus. No. 102472).

Tryon has included *N. amiculata* Phil. and *N. rapulum* Reeve in the synonymy of this species.

92. Polynices uber Val.

= *Mamma uberina* Orb.

+ *M. Phillipiana* Nyst.

Beach shells.

Indefatigable, Hood, and Charles islands (Nos. 102471 and 102368). *M. uberina* and *M. Phillipiana*, of Wimmer's list, are credited respectively to Bindloe and Hood islands.

Subgenus **LUNATIA** Gray.

93. Polynices (Lunatia) otis Brod.

+ var. *fusca* Cpr.
= *N. Galapagosa* Reeluz.
= *N. perspicua* Reeluz.
= *N. Salangocnsis* Reeluz.

Beach, broken shells.

Indefatigable Island (Mus. No. 102170). Found also on the mainland, as far south as Payta, by Dr. Jones.

Family LAMELLARIIDÆ.

Genus **LAMELLARIA** Montagu.

94. Lamellaria ? Stearnsii Dall.

Hood Island, one example in good condition (Mus. No. 102369).

The shell doubtfully assigned to the above species is quite small, only 5 millimeters long, possibly not adult. It resembles in a general way and is closer to Dall's *Stearnsii* than to any species that I am aware of; it has a narrower columella, however, than the species suggested. Without the soft parts it is doubtful whether its place is with this group or with *Marsenina*. Capt. Couthouy's species from Orange Harbor, Patagonia, *L. antarctica* and *L. pratennis*, are represented by figures of the animals, but not the shells, and the *Albatross* example does not agree with E. A. Smith's *patagonica*.

95. Lamellaria ? rhombica Dall.

Beach.

Hood Island, one nearly perfect specimen.

Superfamily DOCOGLOSSA.

Family ACMÆIDÆ.

Genus **ACMÆA** Eschscholtz.

96. Acmæa scutum Orb.

Beach shells.

Hood and Indefatigable islands (Mus. No. 102359). Several specimens from Indefatigable.

97. Acmaea striata Rve.

not = *A. striata* Q. & G.
? = *A. scutum*, Orb. var.

Beach.

Hood Island (Mus. No. 102360). Six small examples. Probably a variety of *scutum*. Carpenter regarded *S. striata* Rve. as a variety of *mesoleuca*.

Superfamily RHIPIDOGLOSSA.

Genus **OMPHALIUS** Philippi.

98. Trochus (Omphalius) Cooksoni Smith.

? = *O. fasciatus* Born.

Beach.

James Island (Mus. No. 102505). A single perfect individual, measuring 4 millimeters in height and 7 millimeters in diameter, not quite the same proportions, but no doubt belonging to the species described by Smith. The specimen before me is beautifully blotched with irregular whitish spots, on a ground color somewhat darker than the rest of the surface, forming a girdle above the umbilicus. It seems strange that the resemblance to *O. fasciatus* of the Antillean region has not heretofore been noticed. A comparison with the very large series of *fasciatus* in the National Museum shows that it is very closely related to that species, if not identical.

Family NERITIDÆ.

Genus **NERITA** Bruguiere.

99. Nerita scabricosta Lam.

= *N. ornata* Sby

Common on the beaches.

Hood, James, and Indefatigable islands (Mus. Nos. 102383, 102280, 102473). Fine large examples, many quite fresh.

Superfamily ZYGOBRANCHIA

Family FISSURELLIDÆ.

Genus **FISSURELLA** Bruguiere.

100. Fissurella macrotrema Sby.

Beach.

Indefatigable Island, one perfect junior (Mus. No. 122129).

101. Fissurella rugosa Sby.

Beach shells, in all conditions.

James, Hood, Indefatigable, Duncan, and Chatham islands. Numerous examples (Mus. Nos. 102366, 102453, 102317). The various aspects of this protean form were found on the beach margins of the several islands named, in most instances in fair condition.

102. Fissurella obscura Sby.

? = *F. rugosa* Sby., variety.

Beach.

Chatham Island (Mus. No. 122124). Several examples of this form, which may be regarded as probably a variety of the variable *rugosa*.

103. Fissurella virescens Sby.

Beach shells.

Chatham Island. One junior in good condition (Mus. No. 122115). Dr. Jones obtained five small specimens at this island.

104. Fissurella nigropunctata Sby.

= *F. virescens* Sby., var.

Beach examples.

Chatham Island. One junior in good condition (Mus. No. 122114).

Genus **FISSURIDEA** Swainson = **GLYPHIS** Carpenter, non Agassiz.

105. Fissuridea inæqualis Sby.

Beach shells in various conditions.

Hood, Indefatigable and Chatham islands, mostly from the first (Mus. Nos. 102367 and 122122).

In my list of Dr. Jones's South American shells, this species and *alta* were erroneously placed in Mr. Pilsbry's genus *Lucapinella*.

106. Fissuridea inæqualis Sby. var. **pica** Sby.

Beach specimen.

Indefatigable Island. A single example (Mus. No. 122121). Mr. Pilsbry is presumably right in assigning this to a varietal position.

107. Fissuridea saturnalis Cpr.

Beach specimen.

Chatham Island, two examples (Mus. No. 122123).

Subclass ISOPLEURA.

Order POLYPLACOPHORA.

Superfamily EOCHITONIA.

Family LOPHYRIDÆ.

Genus **CHITON** s. s.

108. Chiton Goodallii Brod.

Beach, fragments and live specimens.

Chatham and Albemarle Islands, one living example from each; Indefatigable, a single (anterior) plate (Mus. No. 102451). Suggests in a general way *C. magnificus*.

109. Chiton sulcatus, Wood.

Beach, valves, also living examples.

Indefatigable Islands, portion of posterior plate. Charles Island, three living specimens. Hood Island, one worn median valve of a very large individual (Mus. No. 102356).

CARPENTER'S REEVE-CUMING LIST.

The following list of Galapagos shells is made from Dr. Carpenter's Reports to the British Association. The special island is given whenever stated. The list of marine forms was compiled by Carpenter from Reeve's Monographs; the list of land shells* was furnished him by Cuming and contains several species not given by Reeve, and includes erroneously *Bulimus corneus* Sby., a Nicaraguan form. I have added such notes in brackets as may be of assistance in questions of comparison and reference:

1. Gastrochæna rugulosa Sby.
2. Gastrochæna brevis Sby.
3. Gastrochæna hyalina Sby.
4. Petricola amygdalina Sby.
5. Semele rupium Sby., Hood's Island.
6. Semele punctatum Sby.
7. Cardita incrassata Sby. [? error for crassa Sby.]
8. Cardita varia Brod. [=C. flammea Mich.]
9. Chama spinosa Schum. Hood's I. [? echinata var.]
10. Chama jamus Rve. [?=frondosa var.]
11. Chama imbricata. [?=frondosa var.]
12. Modiola capax Cpr.
13. Crenella coarctata Dkr. [Modiolaria s. g.]
14. Byssoarca truncata Sby. [Arca g.]
15. Pecten magnificus Sby.
16. Lima Pacifica Rve., Hood's I. [=arcuata Sby.]
17. Lima arcuata Sby.
18. Anomia adamus Gray.
19. Bulla Quoyii Gray.
20. Bulla rufolabris A. Ad.
21. Bulimus mix Brod. [Bulimulus g.]
22. Bulimus verrucosus Pfr. Charles I. on bushes.
23. Bulimus unifasciatus Sby. Charles I.
24. Bulimus rugulosus Sby. Chatham I.
25. Bulimus eschariferus Sby.
26. Bulimus Darwinii Pfr. on bushes.
27. Bulimus achatinellinus Fbs.
28. Bulimus incrassatus Pfr.
29. Bulimus ustulatus Sby. Charles I. under lava.
30. Bulimus calvus Sby. James I. on tufts of dead grass.
31. Bulimus Jacobi Sby. James I., under scoriæ.
32. Bulimus chemnitzioides Fbs. [Pleuropyrgus g.]
33. Bulimus corneus Sby. [error: a Nicaraguan species.]
34. Bulimus sculpturatus Pfr.
35. Bulimus rugiferus Sby. James I., under scoriæ.
36. Bulimus mucula Pfr.
37. Bulimus Galapaganus Pfr.
38. Bulimus Manini Pfr.
39. Siphonaria gigas Sby.
40. Siphonaria scutellum Desh. [=obliquata Sby?]
41. Lophyrus Goodallii Brod. [=Chiton g.]
42. Lophyrus sulcatus Wood [=Chiton g.]
43. Chiton hirudiniformis Sby.
44. Acmæa striata Reeve.
45. Fissurella rugosa Sby.
46. Fissurella macrotrema Sby. [=rugosa Sby. var.]
47. Fissurella nigropunctata Sby. [=virescens Sby. var.]
48. Fissurella mutabilis Sby.
49. Fissurella obscura Sby. [? F. rugosa Sby. var.]
50. Glyphis inæqualis Sby. [Fissuridea g.]
51. Turbo squamigera Rve. [Senectus g.]
52. Calyptræa varia Brod. [Mitrularia g.]
53. Hipponyx Grayanus Mke. [Amalthea g.]
54. Hipponyx barbatus Sby. [Amalthea g.]
55. Cerithium ocellatum Brug. Polynesia [?]
56. Cerithium nebulosum Sby. [=maculosum Kien.]
57. Cerithium Galapaginus Sby. [=interruptum Mke. var.]
58. Littorina porcata Phil.

* Brit. Assoc. Report 1856, p. 359.

59. Planaxis planicostata Sby.
60. Luponia nigropunctata Gray. [Cypræa g.]
61. Trivia pulla Gask.
62. Trivia fusca Gray [?]
63. Trivia radians Lam.
64. Trivia Pacifica Gray.
65. Trivia suffusa Gray [?]
66. Trivia rubescens Gray [?]
67. Trivia Maugeriæ Gray.
68. Cancellaria mitriformis Sby.
69. Cancellaria ? chrysostoma Sby.
70. Cancellaria hæmastoma Sby.
71. Strombus granulatus Swains.
72. Terebra ornata Gray.
73. Myurella frigata. [=Terebra strigata Sby.]
74. Drillia excentrica Sby.
75. Drillia bicolor Sby. [Crassispira s. g.]
76. Drillia rugifera Sby. [Crassispira s. g.]
77. Drillia albicostata Sby. [Crassispira s. g.]
78. Drillia splendidula Sby. [Crassispira s. g.]
79. Conus nux Brod. [See page ante.]
80. Conus brunneus Wood.
81. Conus minimus var. [=brunneus var.]
82. Conus varius var. [=brunneus var.]
83. Conus Luzonicus var. [=purpurascens var.]
84. Conus diadema Sby. [=brunneus var.]
85. Stylifer astericola Brod.
86. Cirsotrema diadema Sby.
87. Natica maroccana Chem.
88. Lunatia Galapagosa Recluz. [=otis var.]
89. Oniscia tuberculosa Rve. [Oniscidia g.]
90. Oniscia xanthostoma A. Ad. [Oniscidia g.]
91. Cassis coarctata Sby. [Levenia s.g.]
92. Cassis tenuis Gray. [Cypræacassis s. g.]
93. *Triton reticulatus Blve. [Colubraria s. g.]
94. Triton Sowerbyi Rve. [Colubraria s. g.]
95. Triton pictus Reeve. [Epidromus s. g.]
96. Triton clandestinus Lam. [Simpulum s. g.]?
97. Lathirus ceratus Gray.
98. Lathirus tuberculatus Brod.
99. Lathirus varicosus Rve.
100. Mitra gausapata Rve. [Costellaria s. g.]
101. Mitra gratiosa Rve. [Thala s. g.]
102. Mitra muricata Swains. [=lens Wood.]
103. Strigatella tristis Brod. [=Mitra g.]
104. Strigatella effusa Swains. [=Mitra g.]
105. Olivella kaleontina Duclos. [=Oliva g.]
106. Purpura Carolensis Rve. Charles I. [=triangularis Blve.]
107. Purpura patula Linné.
108. Purpura columellaris Lam. [=Purpurella s. g.]
109. Purpura planospira Lam. James I. [=Planathais s. g.]
110. Vitularia salebrosa King.
111. Monoceros grande Gray. James I.
112. Engina carbonaria Rve.
113. Engina pulchra Rve. [=E. Reeviana C. B. Ad.]
114. Engina pyrostoma Sby.
115. Engina maura Sby. [?]
116. Engina crocostoma Rve. [=carbonaria var.]
117. Engina zonata Rve. Charles I.
118. Columbella hæmastoma Sby.
119. Columbella varians Sby. [Anachis g.]
120. Columbella unicolor Sby. [Alia s. g.]
121. Pseudo-Buccinum biliratum Conthouy, Reeve. [Tritonidea s. g.]
122. Engina (Buccinum) pulchrum. [See No. 113.]
123. Nassa nodifera Powis. [=tegula Rve.]
124. Nassa angulifera A. Ad.
125. Nassa nodicincta A. Ad.
126. Fusus Dupetithouarsii Kien.
127. Anachis nigricans Sby.
128. Anachis atramentaria Sby. Chatham I.
129. Anachis rugulosa Sby.
130. Strombina bicanalifera Sby.
131. Strombina lanceolata Kien.
132. Pisania cinis Rve. [Tritonidea s. g.]
133. Murex pumilus A. Ad. [Ocinebra g.]?
134. Murex nucleus Brod. [Purpura g.]

* To the Tritons should be added *T. lineatus* Brod., found in coral sand at the depth of about 6 fathoms. Cuming—Reeve's Monog., species 4, fig. 4, 4 *a*, *b*.

ALBERS' LIST.*

Under the generic title of *Nesiotes*, Albers included all of the Galapagos Bulimi known at the time, with the exception of Forbes's *achatinellinus* and *chemnitzioides*. Albers first used the name *Nasiotus* in 1850, afterwards as revised, Nesiotes in 1860; the latter has since been used in Coleoptera and Hemiptera by various entomological writers. Schlütter's *Omphalostyla* (1838) is probably not the same group as the Galapagos shells.

1. nux Brod.
2. nuciformis Petit.
3. sculpturatus Pfr.
4. asperatus Albers
5. incrassatus Pfr.
6. Darwini Pfr.
7. unifasciatus Sby.
8. ustulatus Sby.
9. galapaganus Pfr.
10. Jacobi Sby.
11. nucula Pfr.
12. calvus Sby.
13. rugiferus Sby.
14. escharifernus Sby.
15. rugulosus Sby.

Of Albers' list of fifteen as above, four, namely, *nuciformis*, *asperatus*, *incrassatus*, and *nucula*, should be regarded as varieties or synonyms of *nux*. Pfeiffer's section *Rhaphiellus* of Ehrenberg's genus *Buliminus* is based upon Forbes's *Bulimus achatinellinus*† and includes only this solitary species.

It would seem that geographical considerations would cause one to hesitate before placing any Galapagos form in Ehrenberg's genus. In the light of to-day, it is an interesting illustration of or commentary on the extreme systematization, to which the pulmonata-geophila, all the world over, have been subjected.

The relations of *achatinellinus* to the other Galapagos forms can not be satisfactorily determined until a larger series has been collected and examined, and the peculiarities of station and habits have been observed.

As to generic or subgeneric titles, one may well ask why *Pleuropyrgus* for the Galapagos forms, like Forbes's *chemnitzioides*, when we have *Pyrgus turritus* Brod. (Reeve, 124) from "Truxillo, Peru," before us.

It is highly probable that the well characterized insular groups of Bulimoids, *Achatinella* and *Partula* of the Sandwich and Society islands, respectively, influenced authors to the extent of causing them to regard the Galapagos forms as an analogous group worthy to be known by a distinguishing name.

THE PETREL-COOKSON SHELLS.

Commander Cookson, in command of H. M. S. *Petrel*, visited Charles, Abingdon, and Albemarle islands in June, 1875. The shells collected by him were determined by Mr. E. A. Smith, of the British Museum,

* Von Martens' Albers' Die Heliceen, etc., Leipzig, 1860, Ed. II.

† Proc. Zool. Soc., London, 1850, p. 56.

from whose paper I have quoted as below. He remarks,* "the shells collected by Commander Cookson are all from Charles Island. They belong to twenty-two species, the majority of which were previously known to have been found in the archipelago, though we were ignorant in some instances of the island on which they were found. Six of the species are additions to this fauna, three of them being apparently undescribed."

1. Purpura patula Linné.*
2. Purpura callaoensis Gray.
3. Engina crocostoma Rve.
4. Rhizochilus (Coralliophila) parvus Smith. A new species.
5. Columbella fuscata Sby.
6. Lathirus varicosus Rve.
7. Lathirus tuberculatus Brod.
8. Mitra (Strigatella) tristis Swains.
9. Conus nux Brod.
10. Cerithium maculosum Kien.
11. Calyptræa sp.
12. Hipponyx Grayanus, var., Mke.
13. Trochus (Omphalius) Cooksoni Smith. A new species.†
14. Fissurella obscura Sby.
15. Chiton (Lophyrus) Goodallii Brod.
16. Chiton (Lophyrus) sulcatus Wood.
17. Arca sp. "Seems most nearly allied to *A. gradata* Brod. & Sby."
18. Bulimus nux Brod.
19. Bulimus unifasciatus Sby.
20. Bulimus escharifernus Sby.
21. Succinea Bettii, Smith.

[18]. "The specimens of this species collected by Commander Cookson are very coarsely striated, and much darker in color than those described by Broderip. They are striped longitudinally with a mixture of slate color and brown, with here and there some pale streaks; and some specimens have a distinct pale band around the middle of the body-whorl; and the four apical whorls are bluish black.

"This species is considerably variable in form, some examples being much more elongate than others.

"The following measurements show how great is the variation in length. One shell is 20 millims. long and 10 in diameter, and another very short one has a length of only 16 millims., and yet is the same width as the longer specimen."

[20]. "This species is quoted by Reeve as having been found at Chatham Island by Darwin. The Charles Island shells are considerably larger than those from the above locality, and also coarser in sculpture, some of them displaying spiral granose or rugose striation as in *B. rugulosus* of Sowerby, from the same islands; and, indeed, they appear to be an intermediate variety or connecting link between the two species, both as regards size and sculpture. The largest specimen measures 19 millims. in length and 7½ in width."

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* Proc. Zool. Soc. London, 1877, p. 61 *et seq.*

* "Both the normal form and the variety (*P. columellaris*) occur at Charles Island." Mr. Smith notices the diminutive size of occasional adult examples of the latter form.

† The author says "it bears a faint relationship to *T. occultus Phil.*, but is more conoid and more strongly sculptured." As the number of examples is not stated, it may be assumed that the author had but a single specimen as the basis of his description.

[21]. A new species, of which the author says the species "is most nearly allied to *S. rubicunda* Pfr., which was described as coming from the island of Masafuera, off the coast of Chile."

"Long., 13 millim.; diam., maxima 8. Apertura longit., 10 millim.; diam., 5¾." Also a "var. *Testa brevior*."

WIMMER'S* LIST OF HABEL'S GALAPAGOS SHELLS—SUMMARY.

1. Murex regius Wood. [Phyllonotus s. g.]
2. Cantharus haemastoma Gray. [=Tritonidea sanguinolenta Duclos.]
3. Tritonium pileare L. [?=T. (Lampusia) vestitus Hinds.]
4. Nassa versicolor C. B.-Ad.
5. Purpura columellaris Lam. [Purpurella s. g.]
6. Purpura planospira Lam. [Planathais s. g.]
7. Purpura melones Duclos. [P melo.]
8. Acanthina grandis Gray. [Monoceros g.]
9. Conchopatella peruviana Lam. [=Concholepas g.]
10. Rhizochilus madreporarum Sow.
11. Rhizochilus parvus Edgar Smith.
12. Latirus varicosus Reeve.
13. Peristernia tuberculata Brod. [Latirus g.]
14. Strigatella tristis Swains. [Mitra g.]
15. Strigatella effusa Swains. [Mitra g.]
16. ?Turricula crenata Brod. [Mitra g.]
17. Columbella castanea Sow.
18. Columbella fuscata Sow.
19. Columbella haemastoma Sow.
20. Columbella cribraria Quoy et Gaim. [=Nitidella cribraria. Lam.]
21. Columbella suffusa Sow. [Anachis s. g.]
22. Columbella atramentaria Sow. [Anachis s. g.]
23. Columbella rugulosa Sow. [Anachis s. g.]
24. Amycla sp.
25. ?Amycla pulchella Sow. [?=Anachis elegantula Morch.]
26. Engina crocostoma Reeve. [=E. carbonaria var.]
27. Volvaria rubella C. B. Ad. [Volvarina s. g.]
28. Volvaria varia Sow. [=Marginella (Volvarina) varia.]
29. Cadinm ringens Swains. [Malea g.]
30. Mamma uberina D'Orb. [=Polynices uber Val.]
31. Mamma Philippina Nyst. [=Polynices uber Val.]
32. Mamma otis Brod. [=Lunatia otis.]
33. Naticina pellucida Reeve. [Sigaratus g.]
34. Morum tuberculosum Sow. [Oniscidia g.]
35. Cassidea tennis Gray. [Cypræcassis g.]
36. Cirsotrema diadema Sow.
37. Acus strigata Sow. [Terebra g.]
38. Eulima micans Carpent.
39. Stylifer astericola Brod et Sow.
40. Cythara oryza Hinds. [Mangilia g.]
41. Conus brunneus (Mawe), Gray. [C. brunneus Wood.]
42. Conus coronatus Dillwyn. [=C. brunneus Wood var.]
43. Conus nux Brod.
44. Leptoconus regalitatis Sow. [=C. purpurascens var.]
45. Cypræa exanthema L.
46. Luponia albuginosa (Mawe) Gray. [Cypræa g.]
47. Luponia nigropunctata Gray. [Cypræa g.]
48. Trivia Mangeriæ Gray.
49. Trivia pacifica Gray.
50. Trivia pulla Gaskoin.
51. Cerithium adustum Kiener. [=C. maculosum Kien., var.]
52. Triphoris? alternatus C. B. Ad. [Triforis g.]
53. Lacuna porrecta Carp.
54. Hamus lemniscatus Phil. [Tectarius g.]
55. Hamus trochoides Gray. [Tectarius g.]

*Zur Conchylien Fauna der Galapagos Inseln von August Wimmer, November, 1879. Akad. der Wissensch. The species herein listed were collected by Dr. Simeon Habel in 1868.

56. Rissoina fortis C. B. Ad.
57. Rissoina inca C. B. Ad.
58. Alvania sp.
59. Siphonium margaritarum Val.
60. Siphonium squamigerum Carp. [Serpulorbis g.]
61. Siphonium pellucidum Brod et Sow.
62. Calyptræa varia Brod. [Mitrularia g.]
63. Cochlolepas barbata Sow. [Amalthea g.]
64. Cochlolepas Grayana Menk. [Amalthea g.]
65. Cochlolepas subrufa Sow. [Amalthea g.]
66. Amalthea antiquata L.
67. Nerita ornata Sow. [= N. scabricosta Lam.]
68. Nerita Bernhardi Recl.
69. Omphalius Cooksoni Edgar Smith. [Trochus g.]
70. Omphalius reticulatus Wood. [Trochus g.]
71. Fissurella macrotrema Sow. [= F. rugosa Sby. var.]
72. Fissurella obscura Sow. [= ? F. rugosa Sby. var.]
73. Lucapina alta C. B. Ad. [Fissuridea g.]
74. Lucapina inæqualis Sow. [Fissuridea g.]
75. Lucapina mus Reeve. [Fissuridea g.]
76. Tectura patina Eschsch. [Acmæa g.]
77. Tectura spectrum Nutt. [Acmæa g.]
78. Nacella? subspiralis Carp.
79. Lophyrus Goodallii Brod. [Chiton g.]
80. Lophyrus sulcatus Wood. [Chiton g.]
81. Lepidopleurus jancirensis Gray. [Chiton.]
82. Acanthochites hirudiniformis Sow. [Chiton.]
83. Bulla rufilabris A. Ad.
84. Janthina fragilis Lam.
85. Bulimulus achatinellinus Forb.
86. Bulimulus Darwinii Pfr.
87. Ellobium stagnale Petit. [Auricula g.]
88. Melampus trilineatus C. B. Adams.
89. Tralia panamensis C. B. Ad.
90. Pedipes angulatus C. B. Ad.
91. Lucina fibula Ad. et Reeve.
92. Lucina punctata L.
93. Actinobolus varius Brod. [Cardita g.]
94. Mytilus Adamsianus Dunker.
95. Margaritifera? Cumingii Reeve. [Meleagrina g.]
96. Isognomon legumen Gmel. [Perna g.]
97. Isognomon quadrangulare Reeve [Perna g.]
98. Barbatia decussata Sow. [Arca.]
99. Barbatia velata Sow. [Arca.]
100. Barbatia divaricata Sow. [Arca.]
101. Barbatia gradata Brod. et Sow. [Arca.]
102. Radula arenata Sow. [Lima g.]
103. Ostrea glomerata Gould.

ANCEY'S GALAPAGOS SPECIES, ETC.

In the *Bulletin of the Société Malac. de France** Mr. C. F. Ancey, under the title of "Nouvelles Contributions Malacologiques," has described *Bulimulus amastroides;* in connection with the description he refers to *B. calvus* Sowerby as the only species with which it may be compared, but his shell has a "facies général très différent," form more oval, less height, and a more delicate sculpture.

His varieties of *B. rugulosus* Sby., namely, *infuscata* and *planospira*, and of *B. eschariferus* Sby., *bizonalis*, and *subconoidalis*, have already been mentioned.

In speaking of the Galapagos Bulimoids he says: "Les Bulimes appartiennent incontestablement au système américaine, mais ils se sont modifiés peu à peu, grâce à la nature volcanique de ces îles et à leur position géographique."

*Juillet 1887, IV, pp. 293–299.

As to the relationship of the Galapagos Bulimi to many of the forms inhabiting various subregions in the general one of the South American main, compare *B. bilineatus* Sby. in Reeve, No. 132, from "St. Elena and west Columbia," with certain aspects of *rugulosus* Reeve's No. 121. Without making an exhaustive or even systematic search for analogies in form, sculpture and general facies, a random reference includes such species as *pustulosus* Brod., *rhodacme* Pfr., and *pupiformis* Brod., from Huasco; *pruinosus* Sby., and *scalariformis* Brod., from Peru; *modestus* Brod., *albicans* Brod., *affinis* Brod., *arrosus* Brod., and *punctulifer* from Chile; *striatus* King and *striatulus* of Sby., *montivagus* Orb., Bolivia; *sordidus* Lesson, *apodometes* Orb., *Laurentii* Sby., Chile and Peru, and *limonoicus*, Orb., also from Peru; *Torallyi* Orb., *trochoides* Orb., and *crepundia* Orb., three Bolivian forms. But it is not simply to these as figured in the monographs, but to the shells themselves that attention is called; many of the species above named it would be quite impossible to represent satisfactorily by one, two, or three figures, or by the same number of examples; the variation which many of them exhibit is so great, that a large series is absolutely necessary.

It will be noticed that the mainland forms suggested by me for comparison with the Galapagos shells are principally Chilian and Peruvian; from the former especially. It would seem so far as the Bulimoids are considered, that the islands were stocked from this part of the continent rather than from Ecuador and farther north.

REIBISCH'S WOLF COLLECTION.

Die conchyliologische Fauna der Galapagos-Inseln, von Paul Reibisch (mit Tafel I und II),* includes the following, being an annotated and descriptive catalogue or summary of the terrestrial species previously described and of others regarded by the author as new and described as such. The material which Reibisch had before him was collected by Dr. Theodor Wolf, State geologist of Ecuador, but the number of examples seems to have been exceedingly limited and generally in an unsatisfactory condition; either immature, weathered, or in some other way imperfect.

For the sake of continuity I have quoted herein from Reibisch's papers all of the previously described species which he has included, following his numbers, though in some cases he has added nothing to our previous knowledge. In other instances the information he has given as to station, altitude, etc., is of sufficient interest to make the publication desirable.

*Ges. Isis in Dresden, 1892, Abh. 3.

1. BULIMULUS Leach.

1. Bulimulus eschariferus Sow.

HABITAT.—Chatham Island (Darwin).

2. Bulimulus unifasciatus Sow.

HABITAT.—Charles Island (Cuming, Wolf). One example, a dead shell without epidermis.

3. Bulimulus nucula Pfr.

HABITAT.—Charles Island (Wolf). Three examples, only one perfect. "The smallest of the group of *B. nux*."

4. Bulimulus verrucosus Pfr.

HABITAT.—Galapagos (teste Pfeiffer, l. c.).

5. Bulimulus asperatus Albers.

HABITAT.—Charles Island (Wolf). "Five examples, all without epidermis."

6. Bulimulus nux Brod.

HABITAT.—Charles Island (Cuming, Wolf). At an elevation of 300 to 600 feet, in the dry zone; only a few imperfect examples collected "under bushes and stones."

7. Bulimulus incrassatus Pfr.

HABITAT.—Chatham Island (Wolf). Not rare at an elevation of 900 to 2000 feet in the wooded region, on bushes, with *B. Chemnitzioides* Forbes and *B. terebra*, Reib., [*B.* (=*Pleuropyrgus*) *Habeli* Stearns]; also variety *sulcatus*, Reib. Habitat, Charles Island (Wolf); also variety *naciformis* Petit. Habitat, Galapagos (Hanet Clery), Charles Island (Wolf).

Reibisch here comments briefly on the plasticity of the *B. nux* form.

8. Bulimulus ustulatus Sow.

HABITAT.—Charles Island (Cuming, Wolf). Color bands are more conspicuous than the sculpture.

9. Bulimulus invalidus Reib.

HABITAT.—Charles Island (Wolf).

10. Bulimulus venustus Reib.

HABITAT.—Charles Island (Wolf). The author says of this, it is close to *ustulatus*.

11. Bulimulus calvus Sow.

HABITAT.—James Island (Cuming); Charles Island (Wolf).

12. Bulimulus Jacobi Sow.

HABITAT.—James Island (Cuming).

13. Bulimulus pallidus Reib.

HABITAT.—Albemarle Island (Wolf), in the dry zone, 200 to 800 feet altitude, under stones and bushes. Of four examples only one was perfect.

14. Bulimulus cinereus Reib.

HABITAT.—James Island (Wolf). The description of this species, according to the author, rests on two examples in poor condition.

15. Bulimulus rugulosus Sby.

HABITAT.—Chatham Island (Cuming, Wolf), 300 to 600 feet; common on bushes on the cliffs and under stones; the prevailing form on Chatham, as *B. nux* is on Charles Island.

16. Bulimulus ventrosus Reib.

HABITAT.—Barrington Island (Wolf). Common on the whole island; holds a similar position here that *nux*, *rugulosus*, and *Wolfi* maintain in the other islands. The form is inconstant and variable. Three examples, one imperfect.

Variety β.

HABITAT.—Chatham Island (Wolf). Two examples, more shiny and darker colored than the Barrington specimens.

17. Bulimulus galapaganus Pfr.

HABITAT.—Galapagos (teste Pfeiffer *l. c.*), Barrington, Wolf. Of the foregoing species, numbered 15, 16, and 17, Reibisch remarks they form a subgroup restricted to the eastern part of the archipelago.

18. Bulimulus acutus Reib.

HABITAT.—Chatham Island (Wolf), at an elevation of 900 to 2,000 feet; very abundant in grassy spots and on the trunks of trees. Two mature, one adolescent examples.

19. Bulimulus curtus Reib.

HABITAT.—Chatham Island (Wolf), 900 to 2,000 feet. Very abundant in grassy places and on the trunks of trees. The author remarks that it forms, with *B. acutus*, a peculiar group restricted in distribution so far as known to Chatham Island.

20. Bulimulus rugiferus Sow.

HABITAT.—James Island (Cuming).

21. Bulimulus nudus Reib.

HABITAT.—Charles Island (Wolf). The author says of this that in form it stands between *sculpturatus* and *rugiferus*, but differs from said species in size, and the sculpture is less distinct. The description rests on two examples, weathered (calcinerten).

22. Bulimulus sculpturatus, Pfr.

HABITAT.—Galapagos (Darwin).

23. Bulimulus Darwini Pfr.

HABITAT.—Galapagos (Darwin).

24. Bulimulus Wolfi Reib.

HABITAT.—Indefatigable Island, on lava cliffs, under stones, etc. This is said to be characteristic of Indefatigable Island, as *rugulosus* is of Chatham and *nux* of Charles Island. Number of examples three, two grown and one immature. Very close to *Darwini*, but differs in having a third tooth, occurring on the outer lip.

25. Bulimulus Simrothi Reib.

HABITAT.—Albemarle Island (Wolf). Not common, in the tree-clad region 1,000 to 2,000 feet elevation; represented by three individuals which may not be fully grown; one of these is deformed. Reibisch remarks that the first eleven species are limited to Charles and Chatham islands;* the latter (No. 11) up to this time observed in only two places. The *rugulosus* and *curtus* groups are restricted to Barrington and Chatham, and 20 to 25 grouped or subgrouped under *Darwini*, as a type, occur on Charles, Indefatigable, James, and Albemarle. Here also comes in as a subgroup *B. Jacobi*.

26. Bulimulus (Pleuropyrgus) terebra Reib.

[*B.* (*Pleuropyrgus*) *Habeli* Stearns. The Nautilus, January, 1892, pp. 98-99.]

HABITAT.—Chatham Island (Wolf), at an elevation of 900 to 2,000 feet in the wooded region, on mossy rocks and under stones; abundant. Four examples, of which hardly one is well preserved.

27. Bulimulus (Pleuropyrgus) chemnitzioides Fbs.

HABITAT.—Chatham Island (Wolf), station 300 to 600 feet altitude; abundant on rocks and under stones, along with *B. rugulosus*.

*Revising the distribution as given above by Reibisch of the first eleven species, which includes *B. nux*, Albermarle must be credited with that species on the proof of *Albatross* examples, and *Darwini*, which he includes in his numbers 20 to 25, must be credited to Bindloe as given by Wimmer.

28. Bulimulus (Pleuropyrgus) lima Reib.

HABITAT.—Chatham Island (Wolf). Rare; occurring with *P. terebra*; only two examples detected, one of these possibly a junior.

Judging by his figure, I should regard the above as a dwarfed or adolescent form of *chemnitzioides*.

Reibisch observes that this group, *Pleuropyrgus*, seems to be restricted to Chatham Island. With our present limited knowledge of the land mollusks of the Galapagos group it would appear so, but much more light is needed to make generalizations of any great value.

29. Bulimulus (Pelecostoma) canaliferus Reib.

HABITAT.—Chatham Island (Wolf). Abundant in moss at an elevation of 900 to 2,000 feet. Four mature individuals.

This may prove to be a valid species; the figure is unsatisfactory; it suggests relationship to *rugifera* and may be a dwarfed variety of that species.

30. Bulimulus (Pelecostoma) cymatoferus Reib.

HABITAT.—Chatham Island (Wolf). "Immature examples" seem to have been regarded as a sufficient foundation for this species, of which the soft parts are unknown, and the genus must rest on shell characters only.

The above is figured in pl. II, 7, of Reibisch's paper; it is Dall's *Leptinaria chathamensis*,* a subgenus of *Stenogyra* in the family *Stenogyridæ*.

II. BULIMINUS Ehrenberg.

31. Buliminus (Rhaphiellus) achatinellinus Forbes.

HABITAT.—Galapagos (Cuming), Chatham Island (Wolf), on mossy rocks at an elevation of 900 to 2,000 feet; apparently rare; no good live examples detected. Reibisch says the sole example figured differs in several particulars from that given in Pfeiffer.

II. PUPA Draparnaud.

32. Pupa (Leucochila) munita Reib.

HABITAT.—Albemarle Island (Wolf), "on bushes near the shore," close to *P. Wolfi*, which is abundant in the province of Guayaquil, Ecuador.

33. Pupa (Leucochila) clausa Reib.

HABITAT.—Indefatigable Island (Wolf).

On bushes near the shore. Reibisch implies that this is a more developed form of *P. Wolfi*.

* Nautilus, January, 1892.

IV. SUCCINEA, Draparnaud.

34. Succinea (Tapada) Bettii Smith.

HABITAT.—Chatham Island (E. A. Smith, *l. c.*).

35. Succinea (Tapada) Wolfi Reib.

HABITAT.—Chatham Island (Wolf).

In the wooded region, 900 to 2,000 feet above the sea, abundant in moss and among rocks; also var. *producta*, a more elongated, slenderer form than the typical *Wolfi*, represented by a single individual; station same as type form.

V. HELICINA Lamarck.

36. Helicina Wolfi Reib. (Pl. II, Fig. 13.)

HABITAT.—Chatham Island (Wolf). Station same as the above *Succineas*, 900 to 2,000 feet altitude, among the mosses and rocks. This form was previously described by Dall, and was named by him *nesiotica*, see *Helicina* (*Idesa*) *nesiotica* in "The Nautilus" for January, 1892.

Of Reibisch's *invalidus* (No. 9) and his (No. 10) *venustus*, the number of examples that he had is not stated. If one may judge of these by the following, it may be assumed that the number was quite inadequate.

Of *pallidus* (No. 13) *four*, only *one* of which was *perfect; cinereus* (No. 14), *two* in poor condition; *ventrosus* (No. 16), *three* examples, one imperfect; *acutus* (No. 18), *two* mature *one* adolescent example; *nudus* (No. 21), *two* examples weathered; *Wolfi* (No. 24), *three* specimens, two grown, one immature; *Simrothi* (No. 25), *three* individuals which may not be fully grown; one of these is deformed.

The extreme variation of these Galapagos bulimoids is so great that it may ultimately be found that what are now regarded as three species, *Darwinii*, *rugiferus* and *sculpturatus*, plus callosities and color, are varieties of one. To these should be added Reibisch's *Wolfi*, which probably belongs to *Darwini*, the *third tooth* on the outer lip which constitutes the difference, is of insignificant value.

DR. JONES'S CHATHAM ISLAND, GALAPAGOS SHELLS.*

1. Mytilus cuneiformis Reeve=M. angustanus Lam.
2. Tellina (Capsa) excavata Sby.
3. Mactra velata Phil.
4. Bulla punctulata A. Ad.
5. Conus lucidus Mawe.
6. Conus nux Brod.
7. Oliva peruviana Lam.
8. Fusus Dupetithouarsii Kien.
9. Purpura melo Duclos.
10. Purpura patula Linné.
11. Purpura patula var.
12. Monoceros tuberculatum Gray + Purpura muricata Gray.
13. Ianthina fragilis Lam.=I. striatula Cpr.
14. Onisciden tuberculosa Brod.
15. Cerithium maculosum Kien.
16. Amalthea antiquata Linné.
17. Amalthea barbata Sby.
18. Acmæa scutum Orb.
19. Fissurella virescens Sby.

* List of shells collected on the west coast of South America, principally between latitudes 7° 30′ south and 8° 19′ north, Proc. U. S. Nat. Mus., Vol. XIV, pp. 307–335, 1891.

DALL'S GALAPAGOS SPECIES.

In Mr. Dall's "Preliminary Report* on the Collection of Mollusca and Brachiopoda obtained in 1887–'88" on the voyage of the U. S. Fish Commission steamer *Albatross* from Fortress Monroe to California, etc., the following new species are described by him, and are recorded as occurring "near the Galapagos Islands," having been dredged at the stations indicated.

1. Leda pontonia Dall.

Stations 2807 and 2808, 812 and 634 fathoms, mud and sand.

2. Verticordia perplicata Dall.

Station 2807, in 812 fathoms.

3. Dentalium megathyris Dall.

Station 2807, in 812 fathoms; this form was also dredged off Chiloe Island and southwest Chili at stations 2788 and 2789, in 1,050 and 1,342 fathoms.

4. Actæon perconicus Dall.

"Near the Galapagos" * * * 812 fathoms.

5. Scaphander interruptus Dall.

Station 2807, * * * 812 fathoms.

6. Pleurotoma exulans Dall.

Station 2808, * * * 634 fathoms.

7. Calliotectum vernicosum Dall.

Station 2807, * * * in 812 fathoms.

8. Pleurotomella argeta Dall.

Station 2807, * * * 812 fathoms.

9. Pleurotomella (Gymnobela) agonia Dall.

Stations 2807 and 2808.

10. Pleurotomella suffusa Dall.

Station 2807.

11. Chrysodomus (Sipho) testudinis Dall.

Station 2807.

12. Nassa Townsendi Dall.

Station 2807.

13. Scala pompholyx Dall.

Station 2807.

* Proc. U. S. Nat. Mus., Vol. XII, pp. 219–362, pls. V–XV, 1889.

14. Gaza Rathbuni Dall.

Station 2818, in 392 fathoms.

15. Haliotis Pourtalesii? Dall.

Station 2815, in 33 fathoms, sand, near Charles Island.

Subsequently in the "Nautilus," January, 1892, Mr. Dall described the following terrestrial forms collected by Dr. G. Baur.

16. Helicina (Idesa) nesiotica Dall.

The first species of the family reported from the Galapagos; Chatham Island, on leaves of plants 1,600 feet above the sea. Mr. Dall remarks, "the type is not unknown in the Panamic region, but is said to be absent from the west slope of the Andes."

17. Leptinaria chathamensis Dall.

"Chatham Island, on ferns at 1,600 to 2,000 feet above the sea. Somewhat analogous forms are found in the mountains of the Panamic region."

18. Zonites (Hyalinia) Bauri Dall.

"South Albemarle Island, on weathered bones of tortoises. * * * The absence of any form of Helix or Zonites has been commented on by most of those naturalists who have treated of the Galapagos shell-fauna, and it was certainly a most extraordinary deficiency from any point of view. This discovery of Dr. Baur's removes the most striking anomaly of the fauna."

LIST OF THE MOLLUSK-FAUNA OF THE GALAPAGOS ISLANDS, COMPILED FROM THE FOREGOING.

Class PELECYPODA.

Order PRIONODESMACEA.

Suborder **OSTRACEA.**

Family OSTREIDÆ.

Genus **OSTREA** Linné.

1. **Ostrea folium** Gmel.

James Island, *Albatross.*

2. **Ostrea glomerata** Gould.

Galapagos, Wimmer.

Suborder **ANOMIACEA.**

Family ANOMIIDÆ.

Genus **ANOMIA** Linné.

3. **Anomia adamus** Gray.

=*A lampe* Gray.

James, *Albatross*; Galapagos, Carpenter.

Suborder **PECTINACEA.**

Family PECTINIDÆ.

Genus **PECTEN** Müller.

4. **Pecten subnodosus** Sby.

James Island, *Albatross.*

5. **Pecten magnificus** Sby.

Galapagos, Carpenter.

Family LIMIDÆ.

Genus **LIMA** Bruguiere.

6. **Lima arcuata** Sby.

James Island, *Albatross;* Galapagos, Carpenter, Wimmer.

7. **Lima pacifica** Reeve.

Hood Island, Carpenter.

Suborder **MYTILACEA.**

Family AVICULIDÆ.

Genus **Avicula** Lamarck.

8. **Avicula Cumingii** Reeve.

Galapagos, Wimmer.

Genus **PERNA** Bruguiere.

9. **Perna Chemnitzianus** Orb.

—*Isognomon C.* Auct.

Indefatigable and Hood Islands, *Albatross.*

10. **Perna legumen** Gmelin.

Hood Island, Wimmer.

11. **Perna quadrangulare** Reeve.

Charles Island, Wimmer.

Family MYTILIDÆ.

Genus **MYTILUS** Linne.

12. **Mytilus multiformis** Cpr.

Hood Island, *Albatross.*

13. **Mytilus Adamseanus** Dkr.

Hood Island, Wimmer.

14. **Mytilus cuneiformis** Reeve.

Chatham Island, Jones.

Genus **SEPTIFER** Recluz.

15. **Septifer Cumingianus** Dkr.

Hood Island, *Albatross.*

Genus **MODIOLA** Lamarck.

16. **Modiola capax** Cpr.

Hood Island, *Albatross;* Galapagos, Carpenter.

Genus **MODIOLARIA** Beck.

17. **Modiolaria coarctata** Dkr.

Galapagos, Carpenter.

Suborder ARCACEA.

Family ARCIDÆ.

Genus **ARCA** Lamarck.

18. Arca truncata Sby.

Galapagos Islands, Carpenter.

Subgenus **BYSSOARCA** Swainson.

19. Arca (Byssoarca), solida Sby.

Indefatigable Island, *Albatross.*

20. Byssoarca gradata B. & S.

Hood Island, *Albatross*, Wimmer; Charles Island, Petrel; James, Chatham, and Indefatigable islands, *Albatross.*

21. Byssoarca Reeviana Orb.

Hood, James, and Indefatigable islands, *Albatross.*

Genus **BARBATIA** Gray.

22. Barbatia velata Sby.

Hood Island, Wimmer.

23. Barbatia decussata Sby.

Hood Island, Wimmer.

Genus **DAPHNODERMA** Mont., not Poli.

24. Daphnoderma divaricata Sby.

Galapagos Islands, Wimmer.

Family LEDIDÆ.

Genus **LEDA** Schumacher.

25. Leda pontonia Dall.

Off Galapagos, 634 fathoms, *Albatross.*

Order TELEODESMACEA.

Suborder CARDITACEA.

Family CARDITIDÆ.

Genus **CARDITA** Bruguieré.

Subgenus **VENERICARDIA** Lamarck.

26. Cardita flammea Mich.

= *C. varia*, Brod.

Hood and James islands; *Albatross;* Bindloe, Wimmer; Galapagos, Carpenter.

27. Cardita crassa Sby.

? = *incrassata* Sby.

Galapagos Islands; Carpenter.

Suborder LUCINACEA.

Family LUCINIDÆ.

Genus **LUCINA** Brugieré.

Subgenus **LUCINA** s. s.

28. Lucina bella Conrad.

Hood, James, and Chatham islands; *Albatross.*

29. Lucina punctata Linné.

Hood Island, Wimmer.

30. Lucina fibula Ad. & Rve.

Hood Island, Wimmer.

Suborder CHAMACEA.

Family CHAMIDÆ.

Genus **CHAMA** Brugnieré.

31. Chama echinata Brod.

Indefatigable and James islands; *Albatross.*

32. Chama frondosa Brod.

Hood and James islands, *Albatross.*

33. Chama imbricata Brod.

Galapagos Islands, Carpenter.

34. Chama inquinata Brod.

Indefatigable Island, *Albatross.*

35. Chama Janus Reeve.

Galapagos Islands, Carpenter.

36. Chama spinosa Brod.

Hood Island, Carpenter.

Suborder CARDIACEA.

Family CARDIIDÆ.

Genus **CARDIUM**, Lamarck.

37. Cardium consors Brod.

James Island, *Albatross.*

Suborder VENERACEA.

Family VENERIDÆ.

Genus **CHIONE** Megerle.

38. Chione multicostata Sby.

James Island, *Albatross.*

39. Chione compta Brod.

Indefatigable Island, *Albatross.*

40. Chione undatella Sby.

James Island, *Albatross.*

Subfamily TAPESINÆ.

Genus **TAPES** Megerle.

41. Tapes grata Say.

Indefatigable Island, *Albatross.*

Suborder TELLINACEA.

Family PETRICOLIDÆ.

Genus **PETRICOLA** Lamarck.

42. Petricola amygdalina Sby.

Galapagos Islands, Carpenter.

Family TELLINIDÆ.

Genus **LUTRICOLA** Blainville.

43. Lutricola excavata Sby.

=*L. alta* Conrad.

Chatham Island, Jones; Indefatigable Island, *Albatross.*

Family SEMELIDÆ.

Genus **SEMELE** Schumacher.

44. Semele rupium Sby.

Hood Island, Carpenter.

45. Semele punctatum Sby.

Galapagos Islands, Carpenter.

Suborder MACTRACEA.

Family MACTRIDÆ.

Genus **MACTRA** Linné.

46. Mactra velata Phil.

Chatham Island, Jones.

Order ANOMALODESMACEA.

Suborder ANATINACEA.

Family VERTICORDIIDÆ.

Genus **VERTICORDIA** Wood.

47. Verticordia perplicata Dall.

Off Galapagos Islands, 812 fathoms, *Albatross*.

Suborder ENSIPHONACEA.

Family GASTROCHÆNIDÆ.

Genus **GASTROCHÆNA** Spengler.

48. Gastrochæna regulosa Sby.

Galapagos Islands, Carpenter.

49. Gastrochæna brevis Sby.

Galapagos Islands, Carpenter.

50. Gastrochæna hyalina Sby.

Galapagos Islands, Carpenter.

Suborder ADESMACEA.

Family PHOLADIDÆ.

Genus **PHOLAS** Linné.

51. Pholas acuminata Sby.

? = *Parapholas acuminata*.

Chatham Island, Jones.

Class SCAPHOPODA.

Order SOLENOCONCHA.

Family DENTALIIDÆ.

Genus **DENTALIUM** Linné.

52. Dentalium megathyris Dall.

Off the Galapagos Islands in 812 fathoms, *Albatross*.

Class GASTROPODA.

Subclass ANISOPLEURA.

Superorder EUTHYNEURA.

Order OPISTHOBRANCHIATA.

Suborder TECTIBRANCHIATA.

Family ACTÆONIDÆ.

Genus **ACTEON** Montfort.

53. Actæon perconicus Dall.

Near the Galapagos in 812 fathoms, *Albatross*.

Family SCAPHANDRIDÆ.

Genus **SCAPHANDER** Montfort.

54. Scaphander interruptus Dall.

Off the Galapagos Islands in 812 fathoms, *Albatross.*

Family BULLIDÆ.

Genus **BULLA** Linné.

55. Bulla punctulata A. Ad.

Chatham Island, Jones, Hood, and Indefatigable, *Albatross.*

56. Bulla Quoyi Gray.

Galapagos Islands, Carpenter.

57. Bulla rufilabris A. Ad.

Hood and Bindloe Islands, Wimmer; Galapagos Islands, Carpenter.

Order PULMONATA.

Suborder STYLOMMATOPHORA.

Subfamily GEOPHILA.

Family LIMACIDÆ.

Genus **ZONITES** Montfort.

Subgenus **HYALINIA** Ferussac.

58. Zonites (Hyalinia) Bauri Dall.

South Albemarle Island, Baur.

Family BULIMULIDÆ.

Genus **BULIMULUS** Leach.

Section **NÆSIOTUS** Albers.

59. Bulimulus nux Brod., Sby. (type).

Albemarle Island, *Albatross;* Charles Island, Petrel, Carpenter, Reibisch, *Albatross;* Chatham Island, *Albatross.*

59. * * banded variety.
1 = *ustulatus* Rve., non. Sby.

Charles Island, *Albatross;* Carpenter, Reibisch.

59. * * * Variety intercised sculpture.

Charles Island, *Albatross.*

59. * * * * Ventricose variety.
2 = Reeve's type.

Charles Island, Carpenter.

3 —— var. = *asperatus* Albers.

Charles Island, Reibisch.

4 —— var. = *incrassatus* Pfr.

Charles Island, Reibisch, Galapagos, Carpenter.

5 —— var. *sulcatus* Reib.

Charles Island, Reibisch.

59. * * * * * elongated variety.

Charles Island, *Albatross.*

6 —— ? *verrucosus* Pfr.

Charles Island, Carpenter.

59. * * * * * * Variety with distorted mouth.

Charles Island, *Albatross.*

59. * * * * * * * Variety with crenulated suture.

Charles Island, *Albatross.*

59. * * * * * * * Variety with sutural nodes.

7 —— = *nuciformis* Petit.

Chatham Island, *Albatross;* Charles Island, Reibisch.

59. * * * * * * * * * Varieties intermediate.

8 —— = *nucula* Pfr.

9 —— + *invalidus* Reib.

10 —— + *renustus* Reib.

Charles Island, Reibisch; Galapagos Island, Carpenter.

60. **Bulimulus Jacobi** Sby.

James Island, Carpenter; Chatham, *Albatross.*

61. **Bulimulus rugulosus** Sby. non Rve.

Charles Island, *Albatross*, Carpenter; Chatham Island, Reibisch, Carpenter.

1 —— var. *infuscata* Ancey.

2 —— var. *planospira* Ancey.

Chatham Island, Ancey.

62. **Bulimulus eschariferus** Sby. non Rve.

Charles Island, Petrel; Chatham, *Albatross*, Carpenter.

1 —— var. *bizonalis* Ancey.

2 —— var. *subconoidalis* Ancey.

63. **Bulimulus unifasciatus** Sby.

Charles Island, Carpenter, Reibisch, Petrel.

64. **Bulimulus calvus** Sby.

Charles Island, Reibisch; James Island, Carpenter.

65. **Bulimulus amastroides** Ancey.

?=*calvus* var.

66. **Bulimulus Galapaganus** Pfr.

Galapagos Island, Carpenter; Barrington Island, Reibisch.

67. **Bulimulus Darwini** Pfr.

Bindloe Island, Wimmer; Galapagos Islands, Carpenter.

68. **Bulimulus rugiferus** Sby.

James Island, Carpenter.

69. **Bulimulus sculpturatus** Pfr.

Galapagos Islands, Carpenter.

70. **Bulimulus Manini** Pfr.

Galapagos Islands, Carpenter.

71. **Bulimulus ustulatus** Sby., non Rve. nor Reib.

Charles Island, Carpenter.

72. **Bulimulus pallidus** Reib.

Albemarle Island, Reibisch.

73. **Bulimulus cinereus** Reib.

James Island, Reibisch.

74. **Bulimulus ventrosus** Reib.

Barrington Island, Reibisch.

74a. ——— var. *β*. Reib.

Chatham Island, Reibisch.

75. **Bulimulus acutus** Reib.

Chatham Island, Reibisch.

76.* **Bulimulus curtus** Reib.

Chatham Island, Reibisch.

77.* **Bulimulus nudus** Reib.

Charles Island, Reibisch.

78.* **Bulimulus Wolfi** Reib.

Indefatigable Island, Reibisch.

79.* **Bulimulus Simrothi** Reib.

Albemarle Island, Reibisch.

Section **RHAPHIELLUS**† Pfr.

80. **Bulimulus achatinellinus** Forbes.

Chatham Island, Carpenter, *Albatross;* Hood Island, Wimmer.

Genus **PYRGUS**.

Section **PLEUROPYRGUS** Martens.

81. **Bulimulus chemnitzioides** Forbes.

? = *B. lima* Reib.

Chatham Island, Carpenter, *Albatross*, Reibisch.

82. **Bulimulus Habeli** Stearns = *B.* (*Pleuropyrgus*) *terebra* Reib.

Chatham Island, *Albatross*, Reibisch.

Section **PELECOSTOMA** Reibisch.

83. **Bulimulus canaliferus** Reib.

Chatham Island, Reibisch.

Family PUPIDÆ.

Genus **PUPA** Draparnaud.

Subgenus **LEUCOCHILA** Martens.

84. **Pupa munita** Reib.

Albemarle Island, Reibisch.

85. **Pupa clausa** Reib.

Indefatigable Island, Reibisch.

Family STENOGYRIDÆ.

Genus **STENOGYRA** Shutt.

Subgenus **LEPTINARIA** Beck.

86. **Leptinaria chathamensis** Dall.

= *Bulimulus* (*Pelecostoma*) *cymatoferus* Reib.

Chatham Island, Baur; Reibisch.

Family SUCCINIIDÆ.

Genus **SUCCINEA** Draparnaud.

87. **Succinea Bettii** Smith.

var. = *S. Wolfi* Reib., var.

Chatham Island, Reibisch, *Albatross;* Charles Island, Petrel.

*I have included these (76–79) in my list, although I suspect their validity.

† Used here tentatively as a section of *Bulimulus* Leach non *Bulimus* Ehr.

88. Succinea Wolfi Reib.

Chatham Island, Reibisch.

—— var. *producta* Reib.

Chatham island, Reibisch.

Superfamily DITREMATA.

Family ONCHIDIIDÆ.

Genus **ONCHIDIUM** Cuvier.

89. Onchidium Lesliei Stearns.

(Plate LI, Figs. 2, 3.)

Albemarle and Charles islands, *Albatross*.

Genus **ONCHIDELLA** Gray.

90. Onchidella Steindachneri Semper.

(Plate LI, Figs. 4, 5.)

Charles and Albemarle islands, *Albatross*.

Suborder BASOMMATOPHORA.

Superfamily AKTEOPHILA.

Family AURICULIDÆ.

Genus **AURICULA** Lamarck.

91. Auricula stagnale Petit.

= *Ellobium stagnale* Petit.

Bindloe Island, Wimmer.

Genus **TRALIA** Gray.

Tralia panamensis C. B. Adams.

Hood and Charles islands, Wimmer.

Subfamily MELAMPINÆ.

Genus **PEDIPES** Adanson.

93. Pedipes angulatus C. B. Adams.

Bindloe Island, Wimmer.

Genus **MELAMPUS** Montfort.

94. Melampus trilineatus C. B. Adams.

Hood Island, Wimmer.

Superfamily PETROPHILA.

Family SIPHONARIIDÆ.

Genus **SIPHONARIA** Sowerby.

95. Siphonaria gigas Sby.

Galapagos Islands, Carpenter.

96. Siphonaria scutellum Desh.

—*obliquata* Sby.?

Galapagos Islands, Carpenter.

Subgenus **WILLIAMIA**, Monterosato.

97. Williamia peltoides Dall.

Hood Island, *Albatross;* Galapagos Islands, National Museum.

Superorder STREPTONEURA.

Order CTENOBRANCHIATA.

Suborder ORTHODONTA.

Superfamily TOXOGLOSSA.

Family TEREBRIDÆ.

Genus **TEREBRA** Brugniere.

98. Terebra ornata Gray.

Galapagos Islands, Carpenter.

99. Terebra strigata Sby.

Galapagos Islands, Wimmer, Carpenter.

Family CONIDÆ.

Genus **CONUS** Linné.

100. Conus brunneus Wood.

Hood, Duncan, James, and Indefatigable islands, *Albatross;* Galapagos Islands, Carpenter, Wimmer.

100a. Conus brunneus, var. diademus Sby.

Hood and James islands, *Albatross;* Galapagos Islands, Carpenter.

100b. Conus brunneus, var. tiaratus Brod.

—*coronatus* Dillwyn.

Hood Island, *Albatross*, Wimmer; Bindloe Island, Wimmer; James Island, *Albatross*.

100c. Conus brunneus, var. —miliaris, Auct. in error.

Hood and Duncan islands, *Albatross*.

100d. Conus minimus, var.

? —*brunneus*, var.

Galapagos Islands, Carpenter.

100e. Conus varius, var.

? —*brunneus*, var.

Galapagos Islands, Carpenter.

101. Conus purpurascens, Brod.

Hood, James, and Indefatigable islands, *Albatross;* Galapagos Islands, Carpenter.

101a. Conus purpurascens, var.

= *regalitatus* Sby.

Hood, Charles, James, and Indefatigable islands, *Albatross;* Galapagos Islands, Wimmer.

101b. Conus purpurascens, var.

= *C. Luzonicus* Sby, var.

Galapagos Islands, Carpenter.

102. Conus nux Brod.

Hood Island, *Albatross*, Wimmer; Charles Island, Petrel, Wimmer; Bindloe Island, Wimmer; James Island, *Albatross;* Chatham Island, Jones; Galapagos Islands, Carpenter.

103. Conus lucidus Mawe.

= *C. reticulatus* Sby.

Hood and James islands, *Albatross;* Chatham, Jones; Galapagos, National Museum.

104. Conus pyriformus Reeve.

Hood Island, *Albatross.*

105. Conus gladiator Brod.

James Island, *Albatross.*

106. Conus Fergusoni Sby.

James and Indefatigable islands, *Albatross.*

Family PLEUROTOMIDÆ.

Genus **PLEUROTOMA** Lamarck.

Subgenus **PLEUROTOMA** ss.

107. Pleurotoma exulans Dall.

Off Galapagos Islands, 812 fathoms, *Albatross.*

Genus **DRILLIA** Gray.

108. Drillia excentrica Sby.

Galapagos Islands, Carpenter.

109. Drillia bicolor Sby.

Galapagos Islands, Carpenter.

110. Drillia rugifera Sby.

Galapagos Islands, Carpenter.

111. Drillia albicostata Sby.

Galapagos Islands, Carpenter.

112. Drillia splendidula Sby.

Galapagos Islands, Carpenter.

Genus **MANGILIA** Risso

Subgenus **CITHARA** Schumacher.

113. Cithara densistriata Cpr.

Chatham Island, *Albatross.*

114. Cithara oryza Hinds.

Bindloe Island, Wimmer.

Subgenus **DAPHNELLA** Hinds.

115. Daphnella sp., ? = casta Hinds.

Indefatigable Island, *Albatross.*

Subgenus **CALLIOTECTUM** Dall.

116. Calliotectum vernicosum Dall.

Off Galapagos Islands, 812 fathoms, *Albatross.*

Subgenus **PLEUROTOMELLA** Verrill.

117. Pleurotomella argeta Dall.

Off Galapagos Islands, 812 fathoms, *Albatross.*

118. Pleurotomella suffusa Dall.

Off Galapagos Islands, 812 fathoms, *Albatross.*

Section **GYMNOBELA** Verrill.

119. Pleurotomella agonia Dall.

Off Galapagos Islands, 812 and 634 fathoms, *Albatross*

Family CANCELLARIDÆ.

Genus **CANCELLARIA** Lamarck.

120. Cancellaria mitriformis Sby.

Galapagos Islands, Carpenter.

121. Cancellaria hæmastoma Sby.

Galapagos Islands, Carpenter.

122. Cancellaria ? chrysostoma Sby.

Galapagos Islands, Carpenter, National Museum.

Superfamily RHACIGLOSSA.

Family OLIVIDÆ.

Genus **OLIVA** Bruguiere.

123. Oliva peruviana Lamarck.

Chatham Island, Jones.

124. Oliva kaleontina Duclos.

Galapagos Islands, Carpenter.

Genus **OLIVELLA** Swainson.

125. Olivella ? gracilis Gray.

Chatham Island, *Albatross.*

Family MARGINELLIDÆ.

Genus **MARGINELLA** Lamarck.

Section **VOLVARINA** Hinds.

126. Volvarina varia Sby.

Galapagos Islands, Wimmer.

127. Volvarina rubella C. B. Adams.

Bindloe Island, Wimmer.

Subgenus **PERSICULA** Schumacher.

128. Persicula imbricata Hinds.

Indefatigable Island, *Albatross.*

129. Persicula phrygia Cpr.

Indefatigable Island, *Albatross.*

Family MITRIDÆ.

Genus **MITRA** Lamarck.

130. Mitra crenata Brod.

Hood Island, Wimmer.

Genus **STRIGATELLA** Swainson.

131. Strigatella effusa Swainson.

James Island, *Albatross;* Hood Island, Wimmer; Galapagos, Carpenter.

132. Strigatella tristis Brod.

Hood, Duncan, and James islands, *Albatross;* Charles Island, Petrel; Galapagos Islands, Carpenter, Wimmer, National Museum.

133. Mitra muricata Swainson.

—*M. lens* Wood.

Galapagos, Carpenter.

Subgenus **COSTELLARIA** Swainson.

134. Costellaria gausapata Rve.

Galapagos Islands, Carpenter.

Subgenus **THALA** H. & A. Adams.

135. Thala gratiosa Rve.

Galapagos Islands, Carpenter.

Family FASCIOLARIIDÆ.

Genus **FASCIOLARIA** Lamarck.

136. Fasciolaria princeps Sby.

James and Indefatigable islands, *Albatross.*

Genus **LATIRUS** Montfort.

137. Latirus ceratus Gray.

Galapagos Islands, Carpenter.

138. Latirus varicosus Reeve.

James Island, *Albatross;* Hood Island, Wimmer; Charles Island, Petrel; Galapagos Island; Carpenter, National Museum.

139. Latirus tuberculatus Sby.

Hood Island, *Albatross,* Wimmer; Charles Island, Petrel; Duncan, James and Indefatigable, *Albatross;* Bindloe Island, Wimmer; Galapagos Islands, Carpenter.

Subfamily FUSINÆ.

Genus **FUSUS** Lamarck.

140. Fusus Dupetithouarsii Kiener.

Chatham Island, Jones; Galapagos Islands, Carpenter.

Family BUCCINIDÆ.

Genus **CHRYSODOMUS** Swainson.

Subgenus **SIPHO** Mörch.

141. Sipho testudinis Dall.

Near the Galapagos Islands, in 812 fathoms.

Genus **PISANIA** Bivona.

Subgenus **TRITONIDEA** Swainson.

142. Tritonidea sanguinolenta Duclos.

= *T. hæmastoma* Gray.

Hood, James, Duncan, Charles, and Indefatigable islands, *Albatross;* Hood and Bindloe Islands, Wimmer; Galapagos Islands, National Museum.

143. Tritonidea cinis Reeve.

Galapagos Islands, Carpenter.

144. Tritonidea biliratum Reeve.

Galapagos Islands, Carpenter.

Genus **ENGINA** Gray.

145. Engina carbonaria Rve.

Hood, Duncan, and James islands, *Albatross;* Galapagos Islands, Carpenter.

145a. Engina carbonaria Rve., var.

= *crocostoma* Rve.

Hood Island, *Albatross;* Charles Island, Petrel; Galapagos Islands, Carpenter, Wimmer.

145b. Engina carbonaria Rve., var.

= *forticostata* Rve.

Hood Island, *Albatross;* Galapagos Islands, Carpenter.

146. Engina pulchra Reeve.

= *Buccinum pulchrum* Reeve.

+ *E. Reeviana* C. B. Adams.

Galapagos Islands, Carpenter.

147. Engina pyrostoma Sby.

Galapagos Islands, Carpenter.

148. Engina maura Sby. ?

Galapagos Islands, Carpenter.

149. Engina zonata Reeve.

Charles Island, Carpenter.

Family NASSIDÆ.

Genus **NASSA** Lamarck.

150. Nassa nodicincta A. Adams.

Charles and Indefatigable islands, *Albatross*.

151. Nassa nodifera Powis.

= *N. tegula* Reeve.

Galapagos Islands, Carpenter.

152. Nassa angulifera A. Ad.

Galapagos Islands, Carpenter.

153. Nassa versicolor C. B. Adams.

Galapagos Islands, Wimmer.

154. Nassa Townsendi Dall.

Near the Galapagos Islands, in 812 fathoms.

Family COLUMBELLIDÆ.

Genus **COLUMBELLA** Lamarck.

155. Columbella castanea Sby.

Hood Island, *Albatross*, Wimmer; Charles and Bindloe islands, Wimmer.

156. Columbella paytensis Lesson.

= *C. spurca* Sby.

Hood and Indefatigable islands, *Albatross*.

157. Columbella fuscata Sby.

Indefatigable, Hood, Chatham, and James islands, *Albatross;* Charles Island, Petrel; Galapagos Islands, Wimmer.

158. Columbella hæmastoma Sby.

Hoods, James, and Indefatigable islands, *Albatross*.

Subgenus **ALIA** H. and A. Adams.

159. Alia unicolor Sby.

Galapagos Islands, Carpenter.

Genus **STROMBINA** Mörch.

160. Strombina bicanalifera Sby.

Galapagos Islands, Carpenter.

161. Strombina lanceolata Kiener.

Galapagos Islands, Carpenter.

Subgenus **NITIDELLA** Swainson.

162. Nitidella incerta Stearns.

Indefatigable Island, *Albatross;* Galapagos Islands, National Museum.

163. Nitidella cribraria Lam.

Hood, Charles, and Bindloe islands, Wimmer.

Subgenus **ANACHIS** A. Adams.

164. Anachis atramentaria Sby.

Chatham Island, Carpenter; Hood Island, Wimmer.

165. Anachis rugulosa Sby.

Hood and Bindloe islands, Wimmer; Galapagos Islands, Carpenter, National Museum.

166. Anachis varians Sby.

Galapagos Islands, Carpenter.

167. Anachis nigricans Sby.

Galapagos Islands, Carpenter.

168. Anachis suffusa Sby.

Bindloe Island, Wimmer.

169. Anachis elegantula Mörch.

= ? *Amycla pulchella* Sby., Wimmer.

Bindloe Island, Wimmer.

Genus **AMYCLA** H. and A. Adams.

170. Amycla sp.

Bindloe Island, Wimmer.

Family MURICIDÆ.

Genus **MUREX** Linné.

Subgenus **PHYLLONOTUS** Swainson.

171. Phyllonotus regius Swainson.

Galapagos Islands, Wimmer.

172. Phyllonotus princeps Brod.

James, Charles, and Indefatigable islands, *Albatross.*

Genus **TROPHON** Montfort.

173. Trophon ? xanthostoma Brod.

= *T. peruvianus* Lesson.

Hood Island, *Albatross.*

Genus **OCINEBRA** Leach.

174. Ocinebra pumilus A. Ad.

Galapagos Islands, Carpenter.

Genus **VITULARIA** Swainson.

175. Vitularia salebrosa King.

Galapagos Islands, Carpenter.

Subfamily PURPURINÆ.

176. Purpura patula Linné.

James, Indefatigable, and Hood islands, *Albatross;* Charles Island, Petrel; Chatham Island, Jones; Galapagos Islands, Carpenter.

Subgenus **PURPURELLA** Dall.

177. Purpura columellaris Lamarck.

Hood, James, Charles, Duncan, Chatham, and Indefatigable islands, *Albatross:* Hood, Charles, and Bindloe islands, Wimmer; Charles Island, *Petrel;* Galapagos Islands, Carpenter.

Subgenus **PLANITHAÍS** Bayle.

178. Purpura planospira Lamarck.

Hood Island, Wimmer, *Albatross*; James and Indefatigable islands, *Albatross;* Galapagos Islands, Carpenter.

Subgenus **THALESSA** H. & A. Ad.

179. Purpura melo Duclos.

James, Duncan, Hood, and Indefatigable islands, *Albatross;* Charles Island, Wimmer; Chatham Island, Jones; Galapagos Islands, National Museum.

180. Purpura callaöensis Gray.

= *Coralliophila callaöensis* Auct.

Charles Island, Petrel, *Albatross.*

181. Purpura triangularis Blve.

= *P. Carolensis* Reeve.

Charles Island, Carpenter.

182. Purpura nucleus Brod.

Galapagos Islands, Carpenter.

Genus **CONCHOLEPAS** Swainson.

183. Concholepas peruvianas Lamarck.

Hood Island, Wimmer.

Genus **MONOCEROS** Lamarck.

= *Acanthina* Waldheim.

184. Monoceros grande Gray.

Hood Island, Wimmer; James and Indefatigable islands, *Albatross;* Galapagos Islands, Carpenter; National Museum.

185. Monoceros tuberculatum Gray.

Chatham Island, Jones.

Subfamily CORALLIOPHILINÆ.

Genus **CORALLIOPHILA** Adams.

Subgenus **RHIZOCHILUS** Steenstrup.

186. Rhizochilus parvus Smith.

Hood Island, Wimmer; Charles Island, Petrel.

187. Rhizochilus madreporarum Sby.

Hood Island, Wimmer.

Suborder STREPTODONTA.

Superfamily PTENOGLOSSA.

Genus **SCALA** Humphrey.

188. Scala pompholyx Dall.

"Near the Galapagos" in 812 fathoms.

Section CIRSOTREMA Mörch.

189. Cirsotrema diadema Sby.

Hood Island, Wimmer; Galapagos Islands, Carpenter.

Family JANTHINIDÆ.

Genus **JANTHINA** Lamarck.

190. Janthina fragilis Lamarck.

= *J. striatula* Cpr.

Chatham Island, Jones; Galapagos Islands, Wimmer.

Superfamily GYMNOGLOSSA.

Family EULIMIDÆ.

Genus **EULIMA** Risso.

191. Eulima micans Cpr.

Bindloe Island, Wimmer.

Genus **STILIFER** Brod.

192. Stilifer astericola Brod. and Sby.

Galapagos Islands, Carpenter, Wimmer.

Superfamily TÆNIOGLOSSA.

Family TRITONIIDÆ.

Genus **TRITONIUM** Cuvier.

Section **COLUBRARIA** Schumacher.

193. Triton Sowerbyi Reeve.

Indefatigable Island, *Albatross;* Galapagos Islands, Carpenter.

194. Triton reticulatus Blve.

Galapagos Islands, Carpenter.

Subgenus **LAMPUSIA** Schumacher.

195. Triton olearium Linné.

Indefatigable Island, *Albatross.*

196. Triton clandestinus Lam.

Galapagos Islands, Carpenter.

197. Triton vestitus Hinds.

Galapagos Islands, Wimmer.

198. Triton lineatus Brod.

Galapagos Islands, Cuming-Reeve (6 fathoms).

199. Triton pictus Reeve.

Galapagos Islands, Carpenter.

Family CASSIDIDÆ.

Genus **CASSIS** Lamarck.

Subgenus **CYPRÆCASSIS** Stutchbury.

200. Cypræcassis tenuis Gray.

James, Charles, Hood, and Indefatigable islands, *Albatross;* Galapagos, Carpenter, Wimmer.

Subgenus **LEVENIA** Gray.

201. Levenia coarctatus Sby.

Galapagos Islands, Carpenter.

Family DOLIIDÆ.

Genus **DOLIUM** Lamarck.

Subgenus **MALEA** Valenciennes.

202. Malea ringens Swainson.

Galapagos Islands, Wimmer.

Genus **ONISCIDIA** Swainson.

203. Oniscidia tuberculosa Reeve.

James, Hood, and Indefatigable islands, *Albatross;* Hood Island, Wimmer; Chatham Island, Jones; Galapagos Islands, Carpenter.

204. Oniscidia xanthostoma A. Ad.

Galapagos Islands, Carpenter.

Family CYPRÆIDÆ.

Genus **CYPRÆA** Linné.

205. Cypræa exanthema Linné.

Var. = *C. cervinetta* Kiener.

James and Indefatigable islands, *Albatross;* Galapagos Islands, Wimmer.

Subgenus **LUPONIA** Gray.

206. Luponia nigropunctata Gray.

James, Hood, and Indefatigable islands, *Albatross;* Hood and Bindloe islands, Wimmer; Galapagos Islands, Carpenter; National Museum.

207. Luponia albuginosa Mawe.

James Island, *Albatross;* Charles Island, Wimmer.

Genus **TRIVIA** Gray.

208. Trivia pacifica Gray.

Hood Island, *Albatross;* Hood, Charles, and Bindloe islands, Wimmer; Galapagos Island, Carpenter; National Museum.

209. Trivia pulla Gaskoin.

Charles and Bindloe islands, Wimmer; Galapagos Islands, Carpenter.

210. Trivia fusca Gray.

Galapagos Islands, Carpenter.

211. Trivia radians Lamarck.

Galapagos Islands, Carpenter.

212. Trivia suffusa Gray.

Galapagos Islands, Carpenter.

213. Trivia sanguinea Gray

Galapagos Islands, National Museum.

214. Trivia rubescens Gray.

Galapagos Islands, Carpenter.

215. Trivia Maugeræ Gray.

Bindloe Island, Wimmer.

Family STROMBIDÆ.

Genus **STROMBUS** Linne.

216. Strombus granulatus Swainson.

Galapagos Islands, Carpenter.

Family TRIFORIDÆ.

Genus **TRIFORIS** Deshayes.

217. Triforis alternatus C. B. Adams.

Hood Island, Wimmer.

Family CERITHIOPSIDÆ.

Genus **CERITHIOPSIS** Forbes and Hanley.

218. Cerithiopsis neglecta C. B. Adams.

Indefatigable Island, *Albatross.*

Family CERITHIIDÆ.

Genus **CERITHIUM** Bruguière.

219. Cerithium ocellatum Brug.

Galapagos Islands, Carpenter.

220. Cerithium galapaginus Sby.

C. interruptum Mke., var.

Galapagos Islands, Carpenter.

221. Cerithium maculosum Kiener.

=*C. nebulosum* Sby.

Hood, Duncan, James, and Indefatigable islands, *Albatross;* Charles Island, Petrel, Chatham Islands, Jones, Galapagos Islands, National Museum, Carpenter.

221a. Cerithium maculosum Kiener.

var. = *C. adustum*, Kiener.

Hood and Charles islands, Wimmer; Duncan, James, and Indefatigable islands, *Albatross;* Galapagos Islands, National Museum.

Family MODULIDÆ.

Genus **MODULUS** Gray.

222. Modulus cerodes A. Ad.

Hood Island, *Albatross.*

Family PLANAXIDÆ.

Genus **PLANAXIS** Lamarck.

223. Planaxis planicostata Sby.

Galapagos Islands, Carpenter.

Family VERMETIDÆ.

Genus **SIPHONIUM** Mörch.

224. Siphonium margaritarum Val.

Hood Island, Wimmer.

Genus **VERMETUS** Mörch.

Subgenus **SERPULORBIS** Sasse.

225. Serpulorbis squamigerus Cpr.

Hood, James, and Indefatigable islands, *Albatross;* Galapagos Islands, Wimmer.

226. Serpulorbis pellucidus Brod.

Hood Island, Wimmer.

227. Serpulorbis pellucidus Brod.

Var. *planorboides* = *Serpula regularis* Chem.

Hood Island, Wimmer.

Subgenus **ALETES** Carpenter.

228. Aletes sp.

Hood Island, *Albatross.*

Family LITTORINIDÆ.

Genus **LITTORINA** Férussac.

229. Littorina porcata Phil.

Galapagos Islands, Carpenter.

230. **Littorina peruviana** Lam.

Galapagos Islands, National Museum.

Genus **LACUNA** Turton.

231. **Lacuna porrecta** Cpr.

Hood and Bindloe islands, Wimmer.

Genus **TECTARIUS** Valenciennes.

232. **Tectarius lemniscatus** Phil.

Hamus lemniscatus.

Hood Island, Wimmer.

233. **Tectarius trochoides** Gray.

Hamus trochoides.

Bindloe Island, Wimmer.

234. **Tectarius galapagiensis** Stearns.

Jan es Island, *Albatross.*

Family RISSOIDÆ.

Genus **RISSOA** Frémenville.

Subgenus **ALVANIA** Risso.

235. **Alvania æquisculpta** Cpr.

Indefatigable Island, *Albatross.*

236. **Alvania reticulata** Cpr.

Indefatigable Island, *Albatross.*

237. **Alvania** sp.

Bindloe Island, Wimmer.

Genus **RISSOINA** Orbigny.

238. **Rissoina fortis** C. B. Adams.

Hood Island, *Albatross;* Bindloe Island, Wimmer.

239. **Rissoina inca** C. B. Adams.

Hood Island, Wimmer; Galapagos Islands, National Museum.

240. **Rissoina stricta** Mke.

Galapagos Islands, National Museum.

Family CALYPTRÆIDÆ.

Genus **MITRULARIA** Schumacher.

241. **Mitrularia cepacea** Brod.

=*Calyptræa cepacea* Auct.

Chatham Island, *Albatross.*

242. Mitrularia corrugata Brod.

=*Calyptræa corrugata* Auct.

James Island, *Albatross.*

243. Mitrularia varia Brod.

Hood, Charles, and Bindloe islands, Wimmer; Galapagos Islands, Carpenter.

243a. Mitrularia sp.

=*Calyptræa* sp.

Charles Island, Petrel (probably belongs to one of the preceding).

Genus **CRUCIBULUM** Schumacher.

244. Crucibulum imbricatum Brod.

James Island, *Albatross.*

245. Crucibulum spinosum Sby.

Chatham Island, Jones.

Genus **CREPIDULA** Lamarck.

246. Crepidula aculeata Gmelin.

Indefatigable and Hood Islands, *Albatross.*

Genus **TROCHATELLA** Lesson.

247. Trochatella radians Lamarck.

Galapagos Islands, National Museum.

Family AMALTHEIDÆ.

Genus **AMALTHEA** Schumacher.

248. Amalthea Grayana Menke.

Hood, Chatham, and Indefatigable islands, *Albatross;* Hood, Charles, and Bindloe islands, Wimmer; Galapagos Islands, Carpenter.

248a. Amalthea Grayana Mke. variety.

Charles Island, Petrel.

249. Amalthea antiquata Linné.

Hood Island, Wimmer; Chatham Island, Jones; Indefatigable Island, *Albatross.*

250. Amalthea barbata Sby.

Chatham, Jones, Indefatigable, and Hood islands, *Albatross;* Chatham Island, Jones; Galapagos Islands, Carpenter.

251. Amalthea ? subrufa Sby.

Galapagos Islands, Wimmer.

Family NATICIDÆ.

Genus **NATICA** Lamarck.

252. **Natica maroccana** Chemnitz.

Galapagos Islands, Carpenter.

Genus **POLYNICES** Montfort.

253. **Polynices dubia** Recluz.

= *N. atacamensis* Phil.

Indefatigable Island, *Albatross*.

254. **Polynices uber** Valenciennes.

+ *uberina* Orb. + *Phillipiana* Nyst.

Hood, Charles, and Indefatigable islands, *Albatross;* Hood and Bindloe islands, Wimmer.

Subgenus **LUNATIA** Gray.

255. **Lunatia otis** Brod.

Indefatigable Island, *Albatross;* Hood Island, Wimmer; Galapagos Islands, Carpenter.

Genus **Sigaretus** Lamarck.

256. **Sigaretus pellucidus** Reeve.

Charles Island, Wimmer.

Family LAMELLARIIDÆ.

Genus **Lamellaria** Montague.

257. **Lamellaria Stearnsii** Dall.

Hood Island, *Albatross*.

258. **Lamellaria ? rhombica** Dall.

Hood Island, *Albatross*.

Superfamily DOCOGLOSSA.

Family ACMÆIDÆ.

Genus **ACMÆA** Eschscholtz.

259. **Acmæa scutum** Orb.

Hood and Indefatigable islands, *Albatross;* Chatham Island, Jones.

260. **Acmæa striata** Reeve.

Hood Island, *Albatross*; Galapagos Islands, Carpenter.

261. **Acmæa patina**. Esch.

Hood, Charles and Bindloe islands, Wimmer.

262. Acmæa spectrum Nutt.—Reeve.

Bindloe Island, Wimmer.

Subgenus **NACELLA** Schumacher.

263. Nacella subspiralis Cpr.

Charles and Hood islands, Wimmer.

Superfamily RHIPIDOGLOSSA.

Family TURBINIDÆ.

Genus **TURBO** Linné.

Section **SENECTUS** Swainson.

264. Turbo squamigerus Reeve.

Galapagos Islands, Carpenter.

Family TROCHIDÆ.

Genus **OMPHALIUS** Philippi.

265. Omphalius Cooksoni Smith.

? = *O. fasciatus* Born.

James Island, *Albatross*; Hood, Charles, and Bindloe islands, Wimmer; Charles Island, Petrel.

266. Omphalius reticulatus Wood.

Hood Island, Wimmer.

Genus **GAZA** Watson.

267. Gaza Rathbuni Dall.

Off the Galapagos, in 392 fathoms.

Family NERITIDÆ.

Genus **NERITA** Brugnieré.

268. Nerita scabricosta Lam.

= *N. ornata* Sby.

Hood, James, and Indefatigable islands, *Albatross;* Galapagos Islands, Wimmer.

269. Nerita Bernhardi Recluz.

Hood Island, Wimmer.

Family HELICINIDÆ.

Genus **HELICINA** Lamarck.

Section **IDESA.**

270. Helicina nesiotica Dall.

= *H. Wolfii* Rieb.

Chatham Island, Baur, Reibisch.

Superfamily ZYGOBRANCHIATA.

Family HALIOTIDÆ.

271. Haliotis Pourtalesii Dall.

Near Charles Island, in 33 fathoms, *Albatross*.

Family FISSURELLIDÆ.

Genus **FISSURELLA** Bruguiere.

272. Fissurella mutabilis Sby.

Galapagos Islands, Carpenter.

273. Fissurella rugosa Sby.

Hood, Duncan, Chatham, James, and Indefatigable Islands, *Albatross;* Galapagos Islands, Carpenter; National Museum.

274. Fissurella macrotrema Sby.

Indefatigable Island, *Albatross;* Hood, Charles, and Bindloe Islands, Wimmer; Galapagos Islands, Carpenter.

275. Fissurella crassa Lam.

Galapagos Islands, National Museum.

276. Fissurella obscura Sby.

? = *F. rugosa* Sby., variety.

Hood, Charles, and Bindloe Islands, Wimmer; Charles Island, Petrel; Chatham Island, *Albatross;* Galapagos Islands, Carpenter.

277. Fissurella nigrocincta Cpr.

Galapagos Islands, National Museum.

278. Fissurella virescens Sby.

Chatham Island, *Albatross;* Jones.

278a. Fissurella nigropunctata Sby.

= *F. virescens Sby.*, var.

Chatham Island, *Albatross;* Galapagos Islands, Carpenter.

Genus **FISSURIDEA** Swainson.

= *Glyphis* Carpenter non Agassiz.

279. Fissuridea inæqualis Sby.

Hood, Chatham, and Indefatigable islands, *Albatross*; Hood, Charles, and Bindloe islands, Wimmer; Galapagos Islands, Carpenter.

279a. Fissuridea inæqualis Sby.

Var.=*F. pica* Sby.

Indefatigable Island, *Albatross*; Galapagos Islands, National Museum.

280. Fissuridea saturnalis Cpr.

Chatham Island, *Albatross.*

281. Fissuridea alta C. B. Ad.

Bindloe Island, Wimmer.

282. Fissuridea mus Reeve.

Bindloe Island, Wimmer.

Subclass ISOPLEURA.

Order POLYPLACOPHORA.*

Superfamily EOCHITONIA.

Family ISCHNOCHITONIDÆ.

Genus **CHÆTOPLEURA** Shuttleworth.

283. Chætopleura janeirensis Gray.

Galapagos Islands, Wimmer.

Genus **CHITON** Linné.

Section RADSIA Gray.

284. Chiton (Radsia) sulcatus Wood.

Hoods, Charles, and Indefatigable islands, *Albatross;* Hood Island, Wimmer; Charles Island, Petrel; Galapagos Islands, Carpenter, National Museum.

285. Chiton (Radsia) Goodalli Brod.

Albemarle, Chatham, and Indefatigable islands, *Albatross;* Charles Island, Petrel; Galapagos Islands, Carpenter, Wimmer, National Museum.

Genus **TONICIA** Gray.

286. Tonicia ? Coquimbensis Frembley.

Galapagos Islands, National Museum.

287. ? Tonicia hirundiformis Sby.

Galapagos Islands, Carpenter, Wimmer.

Superfamily OPSICHITONIA.

Family MOPALIIDÆ.

Genus **ACANTHOCHITON** Leach.

288. Acanthochiton spinifera Frembley.

= *C. aculeatus* Barnes.

Galapagos Islands, National Museum.

* The proper classification of the *Chitons* herein listed awaits the publication of Mr. Pilsbry's Monograph.

The total number of species in the foregoing list embraces 288, and the varieties number 30, all together 318, which may be segregated as follows:

	Species.	Varieties.
Pelecypods, marine	61	....
Scaphopods, marine	1	....
Gastropods, marine	205	13
Gastropods, land	31	17
Total	288	30

Of the 288 species 59 were detected for the first time by the *Albatross* party; of these 12 are deep water forms obtained by dredging, and not previously described; these are included in "Dalls List." Of the shallower water forms two are new and have been described by me elsewhere; also one new and interesting species of land shell. Many of the varietal forms I regard as synonyms or of doubtful validity; whatever may be their value, all or nearly all were obtained by the *Albatross* party, as may be seen by reference to the text.

Acknowledgments are due to Hon. Marshall McDonald, U. S. Fish Commissioner, for the use of the drawing from which the map accompanying this paper has been reproduced, and to Dr. W. H. Dall, who kindly assisted in the correction and revision of the proofs.

PLATE LI.

NOTE.—The numbers following the authority of the specific name denote the actual size of the specimen figured, in millimeters.

Fig. 1. *Bulimulus (Pleuropyrgus) Habeli* length, 17.5; breadth, 3.5; p. 382.
2. *Onchidium Leslici*, dorsal view; length, 37.5; breadth, 31.5; p. 383.
3. *Onchidium Leslici*, ventral view.
4. *Onchidella Steindachneri*, dorsal view; length, 20.0; breadth, 17.0; p. 384.
5. *Onchidella Steindachneri*, ventral view.
6. *Nitidella incerta*, length, 6.02; breadth, 2.75; p. 390.
7. *Tectarius galapagiensis*, length, 7.50; breadth, 5.0; p. 397.

PLATE LII.

MAP OF GALAPAGOS ISLANDS.